

FOOD AND
NUTRITION
TECHNICAL
ASSISTANCE

**Food Security in Madagascar:
A Situation Analysis**

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Prepared for the USAID Mission
in Antananarivo

Food and Nutrition Technical Assistance Project

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ACRONYMS

ADRA	Adventist Development and Relief Assistance
AED	Academy for Education Development
AFD	Agence Française de Développement
ANGAP	Association Nationale pour la Gestion des Aires Protégées
APEX	Projet de Développement du Secteur Fiancier et des Entreprises Privées
BCC	Bebehavior Change Communication
BMI	Body Mass Index
CA	Cooperative Agreement
CES	Conseil Economique et Social
CHU	Centre Hospitalier Universitaire
CI	Conservation International
CITE	Centre d'Information Technique et Economique
CMS	Centre Multiplicateur des Semences
CMS	Commercial Market Strategies
CNC	Comité National de Coordination
CNLA	Comité National de Lutte Antiacridienne
CNS	Conseil National de Secours
COI	Commission de l'Océan Indien
COMESA	Common Market of Eastern and Southern Africa
CPR	Contraceptive Prevalence Rate
CRESAN	Projet d'Ammélioration du Secteur Santé (WB)
CRESED	Projet de Renforcement du Système Education (WB)
CRIC	Cellule Restreinte d'Intervention aux Calamités
CRS	Catholic Relief Services
CS	Child Survival
CSP	Country Strategic Plan
CVA	Cellules Villagoises d'Animation
CWS	Church World Service
DAA	Disaster Assistance Authority
DAP	Development Activity Proposal
DCPE	Document Cadre de Politique Economique
DEF	Direction des Eaux et Forêts
DEWS	Disaster Early Warning System
DHS	Demographic and Health Survey
DSRP	Document Intérimaire de Stratégie de Réduction de la Pauvreté
EAC	Emergency Action Committee (USAID)
ECHO	Environmental Change and Health Outcomes
EIA	Environmental Impact Assessment
EU	European Union
FAO	Food and Agriculture Organization
Faritany	Province
FENU	Fonds d'Equipement des Nations Unies

FFW	Food for Work
FID	Fonds d'Intervention pour le Développement
Fikrifama	Malagasy NGO working with CWS
Fivondronana	District
FMG	Franc Malgache
FOFIFA	National Centre for Applied Research in Rural Development
Fokontany	Neighborhood
FS/D	Food Security and Disaster Unit
GDP	Gross Domestic Product
GM	Growth Monitoring
GoM	Government of Madagascar
GR	General Relief
GTDR	Groupe de Travail de Développement Rural Régional
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
IEC	Information, Education, Communication
ILO	International Labor Organization
IMCI	Integrated Management of Childhood Illnesses
IMCS	Multi-Indicator Cluster Survey
IMF	International Monetary Fund
INSTAT	Institut National des Statistiques
IR	Intermediate results
IRRI	International Rice Research Institute
JSI	John Snow Inc. In Madagascar: Jereo Salama Ikeda
KFW	Kreditanstalt für Wiederaufbau (German financial cooperation)
KPC	Knowledge, Practices and Coverage
LDI	Landscape Development Initiatives
MDM	Médecins du Monde
MDRO	Mission Disaster Relief Officer
MDRP	Mission Disaster Relief Plan
MIS	Management Information Systems
MPRH	Ministère de la Pêche et des Ressources Halieutiques
MSF	Médecins sans Frontières
MSH	Management Sciences for Health
NAC	Projet de Nutrition à Assise Communautaire (UNICEF)
NGO	Non-Governmental Organization
NRM	Natural Resources Management
ONE	Office National pour l'Environnement
PADR	Plan d'Action pour le Développement Rural
PL 480	Public Law 480, Title II
PNSAN	Programme National de Surveillance Alimentaire et Nutritionnelle
PNVA	Programme National de Vulgarisation Agricole
PRA	Participatory Rural Appraisal
PSI	Population Services International
PVO	Private Voluntary Organization
RRA	Rapid Rural Appraisal
SEECALINE	Surveillance et Education des Ecoles et des Communautés en

Alimentation et Nutrition Élargie

SO	Strategic Objective
TFR	Total Fertility Rate
UNDP	United Development Program
UNFPA	United Nations Fund for Population Activities
UNICEF	United Nations Children's Fund
UPDR	Unité Politique de Développement Rural
USG	United States Government
VAM	Vulnerability Assessment Mapping
Vonny Voina	Project of SAF
WB	World Bank
WFP	World Food Program
WWF	World Wildlife Fund

TABLE OF CONTENTS

Preface.....	i
Executive Summary	ii
Chapter 1: Theoretical and Methodological Considerations in the Design of Food Security Interventions	1
The Relationship Between Poverty and Economic Growth	1
The USAID Food Security Conceptual Framework	4
Targeting Food Security Interventions	7
<i>Children Under Two Years of Age.....</i>	<i>8</i>
<i>Women.....</i>	<i>8</i>
<i>Households Vulnerable to Disasters.....</i>	<i>9</i>
<i>Biodiverse Ecoregions</i>	<i>9</i>
Chapter 2: General Overview of Madagascar	11
The Institutional Context	12
<i>Economic Liberalization.....</i>	<i>13</i>
<i>Decentralization and the Action Plan for Rural Development.....</i>	<i>13</i>
Chapter 3: Food Availability in Madagascar.....	15
Determinants of Food Availability at the Regional and Local Levels.....	16
<i>Roads, Food Markets and Storage Infrastructure</i>	<i>18</i>
<i>Population Demand for Food</i>	<i>19</i>
Actions Undertaken to Support Food Availability	19
Chapter 4: Food Access in Madagascar.....	23
Agricultural Production	23
<i>Production of the Main Staples</i>	<i>23</i>
<i>Access to the Factors of Production</i>	<i>28</i>
Incomes	37
<i>Rural Incomes</i>	<i>38</i>
Transfers and Loans.....	42
Food Security in Urban Areas.....	43
<i>Food Acces in Urban Settings</i>	<i>43</i>
<i>Urban Food Prices</i>	<i>44</i>
<i>Urban Monetary Incomes</i>	<i>44</i>
Environment.....	45
<i>Deforestation and Land Clearings</i>	<i>46</i>
<i>Actions Undertaken in the Environmental Area</i>	<i>47</i>
Future Directions in Food Access.....	49
<i>Food Access in Rural Areas.....</i>	<i>49</i>
<i>Food Access in Urban Areas</i>	<i>56</i>

Chapter 5: Food Utilization In Madagascar	58
Maternal and Child Health and Nutrition in Madagascar	58
<i>Maternal Health and Nutrition</i>	58
<i>Infant and Child Health and Nutrition</i>	59
<i>Immunization</i>	62
Water and Sanitation Services	63
Family Planning Services, Reproductive Health and the Prevention of STDs	64
Health and Disease Burdens in Madagascar	65
<i>Cholera</i>	65
<i>HIV/AIDS</i>	66
Actions Undertaken to Address Maternal and Child Health and Nutrition	66
<i>Actions by the Government of Madagascar</i>	66
<i>Actions by USAID and Other Donors</i>	67
Future Directions in Food Utilization	70
Chapter 6: Disasters and Food Security in Madagascar.....	72
Pest Infestations	72
Cyclones and Floods	73
Droughts.....	73
Current Efforts in Disaster Preparedness, Mitigation and Prevention (DPMP)	74
Chapter 7: Resources Available for Food Security Interventions.....	76
Development Assistance	76
<i>Current Use of DA Funding in USAID/Madagascar</i>	76
P.L. 480, Title II Resources	77
Resource Integration	78
Title II Programs Currently Active in Madagascar.....	79
<i>ADRA:</i>	79
<i>CARE</i>	79
<i>CRS</i>	80
Chapter 8: Other Development Interventions	81
Overview of Foreign Assistance in Madagascar	81
Sectoral Allocations of Donor Assistance	82
<i>Agriculture and Natural Resources Management:</i>	82
<i>Health Sector</i>	83
<i>Infrastructure</i>	85
Chapter 9: Summary and Conclusions.....	87
Annex 1	90
Bibliography	96

PREFACE

This document examines the options for USAID's priority interventions in the areas of food security and nutrition for Madagascar during the 2003-2008 period. The stated goal of the USAID Mission in Madagascar is to reduce poverty. Improving food security is a key component of this mandate. As such, the document is conceived to fit explicitly within USAID's country strategy plan. Although food security is often equated with food aid, the situation analysis presented here goes well beyond food aid. The use of food is acknowledged where appropriate, but it is recognized that food alone will not be sufficient to generate sustainable impacts on food security and nutrition, and that other resources will be needed. Thus, this document advocates for a close integration of all the resources available to the Mission—Development Assistance, Public Law 480 Title II, Child Survival—at the operational level. This presupposes a good understanding of what can be achieved with each type of resource and a well coordinated relationship between custodians of those funds—Cooperating Sponsors, SO teams, Collaborative Agreements.

The document is also written taking into account the relative position of USAID as a development actor in Madagascar. In 1999, USAID was the fourth largest donor in the country, after the World Bank, the European Union and France. The resources provided by the US government represented approximately 7% of all foreign aid in the country. Although important, those resources are constrained, and it is critical that they be used judiciously. Accordingly, this document aims at defining well targeted and well defined actions, that take maximum advantage of integration between internal and external resources and that are elaborated in full knowledge of the efforts undertaken by the Government of Madagascar (GoM) and other actors of development in Madagascar.

Chapter 1 offers theoretical considerations on the relationships between food security, poverty reduction and economic growth; and presents the food security model, as conceptualized by USAID. Chapter 2 provides a general introduction to Madagascar. Chapters three, four and five, respectively, provide a situation analysis of food security in Madagascar using the usual distinction between food availability, food access and food utilization. That analysis covers environmental, agricultural and health issues from the economic, cultural, institutional, historical and political standpoints. The situation with respect to disasters, frequent in Madagascar, is covered in the sixth chapter. The seventh chapter examines the resources available to the Mission, and how they can be used and combined in designing food security interventions. The eighth chapter summarizes the recommendations made in the document, and considers issues related to the geographical focus of interventions. Annexes are included that summarize the role of other development actors in the country.

EXECUTIVE SUMMARY

Madagascar is currently one of the poorest countries in the world. Over the last four decades, mean real per capita incomes have gone down by a third. Madagascar now finds itself near the bottom of the list of the human development index (149th over 174) and with every passing year, the country produces less of its food needs. Currently, three out of four households fall below the poverty line and one of every two children under two years of age is moderately or severely malnourished. Education levels are in recession.

Several attempts have been made to improve economic performance and reduce poverty and food insecurity. The first decade after Independence (1960-1972) saw promising advances in the area of food production and GDP growth. However, social movements in 1971 ushered in a new regime that embarked upon the collectivization of the economy and that contracted large loans to undertake ambitious infrastructural investments. The oil crisis of the mid-1970s, coupled with deteriorating terms of trade and the growing external debt eventually reversed economic growth, forcing the Government to adopt structural adjustment reforms in the 1980s. The economy's leading indicators were brought under control, but at great costs to social programs. Social turmoil flared up again in 1991, bringing another change in government while seriously affecting the economy with the PIB falling by 6.3% in that year alone. Social peace returned with the instauration of parliamentary democracy in 1991, but the lowly 1.3% growth between 1992 and 1995 kept trailing behind population growth, which stood at 2.8% per annum. GDP growth would remain negative until 1997, when it finally showed a 4.7% rate. Similar rates have been maintained in years thereafter. With the structural adjustment reforms, the State is disengaging from productive undertakings, concentrating its actions on regulatory functions and enthrusting the private sector as the main engine for economic development. Recent initiatives, such as the National Poverty Reduction Strategy, have been proposed to address urgent social problems but the scarce resources at the disposal of the State imply that support for many of those actions will depend upon the international community. This is the background against which this document is written.

Three key premises guide the elaboration of this Food Security Situation Analysis, which are laid out in Chapter One. First, a distinction is drawn between poverty alleviation/food security programs on the one hand, and programs aimed at promoting economic growth on the other hand. Available empirical evidence in effect demonstrates that, while economic growth can favor the poor, it will generally not have this impact unless such specific effects are sought. Growth, in other words, is a necessary but not a sufficient condition for poverty alleviation and the reduction of food insecurity. Second, and following our first premise, it is proposed that to be pro-poor, economic interventions be accompanied by actions that enable and empower the poor to take advantage of the development opportunities that come their way. This effectively places education, skills acquisition and risk management as themes that cross cut all interventions to be developed by USAID/Madagascar and its partners, whether in the areas of agriculture and natural resources, small enterprise development or health and nutrition. Once that is assured, the long run vision is one that sees investment in the rural economy, open markets, and private initiative as keys to cutting hunger and reducing poverty. This position recognizes the synergistic relationship between improvements in the social sectors and those in the productive sectors. In the long term, the capacity for improving quality and access to critical social services

will have to depend on increasing state revenues which depends on a growing economy. In the short term, the donor community should play a key role in making the synergy possible. Third, it is proposed that maximum food security benefits will be obtained by concentrating efforts towards those special subgroups among the poor that are considered most vulnerable to food insecurity: children under the age of two, women, and communities vulnerable to disasters—particularly communities found in areas of cyclonic activity. In addition, communities in fragile eco-regions are also targeted in response to the USG's special concern with Madagascar's unique bio-diversity

The document uses the USAID "Food Security Conceptual Framework" to organize the information. USAID defines food security as "when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life". Because there is no single, direct measure of food security, the general concept is divided into the three dimensions of availability, access and utilization. Food availability is achieved when sufficient quantities of food are consistently available to all individuals within a country. Such food can be supplied through domestic output, commercial imports, existing stocks or food assistance. Food access is ensured when households and all individuals within them have adequate resources to obtain appropriate foods for a nutritious diet. Access depends on the income (in cash or in kind) available to the household. Food utilization is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water, and adequate sanitation. Effective food utilization depends in large measure on knowledge within the household of food storage and processing techniques, and on basic principles of nutrition, child care and illness management. Following those definitions, food security may be influenced by a wide array of development interventions. In a situation of adequate food availability, however, the most immediate impacts on food security will be achieved by increasing agricultural productivity, raising household incomes, and improving household nutrition, especially for children and mothers. As suggested by the title, this document assesses the situation with respect to each of those outcomes, examines what is currently being done to address the problems detected, and proposes interventions to improve those conditions.

After a general overview of the situation in Madagascar in Chapter Two, Chapters Three to Five offer a detailed assessment of the food security situation in the country and of the options for future interventions. Concentrating on **food availability**, Chapter Three proposes two levels of analysis: national, and regional. At the national level, it is established that the country currently meets about 98 percent of its internal demand (between internal production, commercial imports and food aid). A growing food gap is however expected in the future if the current situation of stagnant productivity persists. Assuming current per capita consumption is maintained, the food gap will increase from 92 thousand tons in 2000, to 591 thousand tons in 2010. When considering nutritional requirements, the gap will grow to 661 thousand tons in 2010 (out-year projections do not include food aid). Domestic food production will have to increase significantly to address this growing gap. Given past performance, however, it is unlikely that this will happen at the scale and pace that are necessary to cover all needs. Furthermore, given the high transport-to-value costs of most staple foods and existing OECD food policies, local producers are poorly equipped to compete with foreign markets in staple commodities and face displacement even at the national market level. The agricultural sector will thus have to diversify

and export more non-staples to increase national income streams, so the country can generate the foreign exchange it needs to address its food and nutritional gaps.

Regional food availability also currently presents problems. The SEECALINE studies showed that 67% of all the Malagasy people did not meet their needs in terms of kcal. Problems in food availability are traced mainly to the low productivity of agriculture, and the lack of infrastructure (markets, roads and storage facilities). To address the problem of regional food availability, the demand for food may be stabilized by controlling population growth; and the regional supply of food may be increased by reducing isolation, by fostering inter-regional market links through the construction of roads, markets and storage facilities and by increasing local food production. Given the high cost of hard infrastructure and the restricted resources available to the Mission, the recommended mode of action for USAID intervention is to support joint actions by the State, donors, civil society and the private sector to promote the formation of market linkages and to build and maintain transport and communication infrastructure—for instance, it is recommended that matching contributions from other social actors be requested before releasing financial and in kind resources for hard infrastructure in USAID focus areas. Soft infrastructure (the dissemination of price information, support to producer and trader associations, etc) as well as agricultural production, are also to be supported if regional food availability is to be enhanced.

Agricultural productivity increases contribute powerfully to food security, by augmenting the quantity of food available in the country, and by providing greater **food access** to rural households, either because it enables them to produce more food, or because it provides them with higher incomes from the sale of their products. Households' food access is also supported by the transfers they receive, whether these are provided by their social networks or by the Government and its partners, for instance through food ration distribution. Those sources of food are the same for both rural and urban households, although the mix between these sources varies depending on where one lives. Among rural households, the main determinants of own production are their farming technology, their access to land, labor, capital and knowledge, and the conditions of input/output markets. The main food crops in Madagascar are rice and manioc, with the latter being relatively more important for households in the South, and for poor households everywhere. Livestock production is also important in the South and West of the island. Productivity in all those sub-sectors, however, is very low with traditional farming methods prevailing most everywhere. Farmers' low adoption of modern technologies relates to their poor access to factors of production; to bottlenecks in the input/output markets (in part because of poor infrastructure); to the modern technologies themselves, which are either not well adapted to local conditions, or are poorly promoted by the extension system; and to the risks that face agriculture in Madagascar (cyclones, droughts and locusts). All those factors induce strong risk avoidance behavior, particularly among poorer, smaller family farms. Enabling resource-poor households to invest in more productive and more profitable—but riskier—agriculture requires that farmers' access to credit, land and technical knowledge be increased; and that the risks they face be reduced. Given the heterogeneity of agricultural conditions, several avenues may be pursued—either independently or in conjunction—to achieve those goals. In areas where markets are functioning, associative links between farmers and agribusiness may provide access to credit, risk insurance and technical know-how while fostering regional economic growth. In economically marginal areas where market access is poor and/or comparative advantages are low, interventions may build upon the natural and organizational assets already in place to

foment the intensification of staple crops, while promoting a sound stewardship of the natural resource base. Diversification is also to be encouraged, although the incentives to do so will be reduced by poorly functioning input/output markets. Technological bottlenecks also need to be addressed: the high yielding varieties that already exist for Madagascar have not yet been sufficiently promoted. Promising extension models, which already exist in the country (e.g. Tany Meva) should be studied, replicated and taken to scale. In all cases, the particular interests of the groups vulnerable to food insecurity must be kept in mind. In particular, the livelihood system in communities susceptible to cyclonic activity should be strengthened to avoid prolonged disruptions of their food economy.

In addition to their relevance for food security, **environmental issues** have a particular acuity in Madagascar, which stands as one of the prime bio-diversity heritage sites of the world. During this century, the combination of colonization of primary forests, shifting cultivation, overgrazing, charcoal production, human made bush fires, and the pressure to create more farmland have resulted in the massive destruction of forested areas. In the western zone, and along the eastern coast, the persistence of slash and burn techniques represents the main threat. In the central highlands, the main threat comes from increases in demographic pressures, pushing people into the hillsides and remaining primary forests. Overall, the country has already lost 80% of its forest cover, more than half of which has disappeared in the last 40 years. The problem affects not only the forest areas but also their tributary eco-regions: because deforestation affects the hydrological balance in upper watersheds, the productive valleys and rice fields below end up being affected as well. Thus as deforestation advances and destroys what is perhaps the country's most valuable resource, it leaves the local and downstream populations poorer and more food insecure. The most promising interventions to contain the problem have adopted an eco-regional approach that aims at creating sustainable income generating activities from the proper husbandry of core forested areas, while promoting intensive agriculture in adjacent areas in an effort to reduce migration to the forest. The protection of existing traditional farming systems is also being recognized as important. This was illustrated when the sustainable commercial cropping systems that thrived along the Tanala escarpment were almost wiped out after the railroad that linked those communities to market centers was destroyed by the hurricanes that hit the region in 2000. Only the timely intervention of development organizations to repair the railroad prevented the uprooting of tree crops and a regression to slash and burn methods. As USAID partners improve their understanding of what works and where, continued attention will have to be devoted to burning issues such as property rights, collective actions, local capacity building, energy conservation and the creation of income generating opportunities from the sustainable management of the resources. Here again, a particular attention to the plight of women, who are disfavored in their access to resources, will enhance further the impact of agricultural and NRM interventions on food security outcomes.

Food access in urban areas is chiefly determined by the capacity of households to purchase food, which, in turn, is determined by food prices and by household income. The purchasing power of the minimum wage has evolved in different directions over the last two decades, depending on the commodities examined. The favored staple is rice, but its price has increased by a factor of two over the last fifteen years, forcing many urban poor to switch to inferior goods such as manioc or maize, whose prices have been kept relatively stable (maize) or even decreased (wheat, manioc) over the last two decades. Access to food is, therefore, relatively

stable although the urban poor have been forced over time to settle for a lower quality diet and one that they may prefer less. Improving aggregate prices will benefit urban dwellers, who are net purchasers of food, while the improvement of crop production conditions in rural zones will reduce price fluctuation both in rural and urban areas. It appears that social mobility (moving in and out of poverty) is greater in urban areas than in rural areas. To increase urban households' purchasing power and upward mobility, the approach should include elements that have an enabling effect on their income levels. In this regard, improving access to formal education represents an essential intervention for long term individual economic improvement, while skill training in areas where needs exist but are untapped, provide excellent opportunities for improving people's options in the short term. CARE's Title II Mahavita program has done excellent work of this kind by creating employment opportunities that cater to the acute urban needs for water and sanitation needs. Scheme such as CARE's, which address food security from the twin angle of improved food utilization (though healthier environments) and food access (through income generation), should be supported in the future so they continue delivering key services to the urban poor. The food security impact of those actions may be further enhanced by focusing more specifically on improving urban women's skills and opportunities for gainful, sustainable employment.

Food utilization interventions, which are concerned with ensuring that individuals have the biological capacity to use food, are generally assessed using health and nutrition indicators. Primary targets for food utilization programs are children under two years of age, and women at all stages of their growth and reproductive lives. This is because the nutritional status of an individual is in a large measure determined during the first years of life, when the most critical periods of growth take place. Most of the functional impairments resulting from malnutrition are inflicted before two years of age, since once a child reaches two years of age, the damages from impaired growth will be permanent thereafter. Early malnutrition has particularly damaging consequences for women and their future offsprings: growth failure in female children leads to small adult women; small maternal size and poor nutrition of pregnant women leads to low birth weight; and low birth weight leads to subsequent growth failure in children. Thus the vicious cycle of malnutrition is driven by inter-generational links. Adolescent pregnancies further contribute to this vicious cycle through the impairment of the mother's growth and the increased incidence of low birth weight.

In Madagascar, **maternal health** is deficient in many aspects. About 21 percent of women have a low body mass index (one of the highest rates in Sub Saharan Africa) and high levels of micro-nutrient deficiency—particularly iron and vitamin A—are common. Less than half of women benefit from delivery assistance from qualified health personnel, and their knowledge of family planning and HIV/AIDS prevention measures is low. **Children under two years of age** are similarly affected by poor health and nutrition conditions. Only 22% of children are exclusively breastfed until six months of age, while the others are given complementary liquids and foods, often in the few hours immediately after birth, placing them at high risk of diarrhea and other gastro-intestinal diseases. After six months of age, children must be introduced to complementary foods, while breastfeeding is maintained. Most children continue to receive breastmilk until two years of age, but two thirds of all children between 6 and 24 months of age do not receive adequate complementary food. Problems are traced in terms of the quantity, quality, density and frequency of feeding. Finally, children are highly exposed to infectious

diseases, as only 38,3% are fully immunized; and 20,3% have not received any protection. All these factors contribute to the serious rates of growth failures noted among children in Madagascar, where one of every two children at 24 months of age is considered stunted and 40% are underweight. At the level of the general population, finally, malaria and acute respiratory infections are common.

There are well organized **efforts to address child and maternal malnutrition** in Madagascar, many of which are spearheaded by USAID and its partners (Linkages, JSI, CRS, ADRA, etc). There is a broad consensus among key stakeholders as to the key nutritional needs of the population in Madagascar. Also, state of the art approaches in dealing with disease and malnutrition are well disseminated among field operators. Furthermore, the Government's interest in nutrition is high, and the policy environment is favorable. Yet, as demonstrated in the paragraph above, many priorities still need to be urgently addressed. In the area of maternal health and nutrition, future programs should focus on increasing deliveries attended by trained staff; on expanding the coverage of Vitamin A distribution among lactating mothers, and on reducing the high levels of iron-deficiency anemia among women of reproductive age. In the area of child health and nutrition, exclusive breastfeeding must be promoted for infants less than 6 months of age, and mothers need to upgrade their complementary feeding practices after six months of age. Complementary to those efforts, efforts must be made to improve the availability of potable water and sanitation infrastructure, and of family planning and STD/HIV/AIDS services. Finally, education in reproductive health issues must also concentrate on postponing the age of first pregnancy until after adolescence and increasing birth intervals. Increasing maternal food intake will also be important, so they gain the adequate weight for optimal fetal growth, have favorable birth outcomes and meet the energy requirements associated with lactation. Reducing the demand for female labor during and after pregnancies, and promoting access to labor saving devices is also important. This is an area where good synergy can be generated by working across sectors. Research and extension in agriculture can strive to be women- and nutrition-friendly, for instance by developing technologies that contribute to reducing women's workload. For instance in terms of food preparation, seed crops can be tested that are easier to mill and cook faster; or in terms of energy, technologies may be developed that reduce fuelwood consumption and the associated demand on the time women spend gathering fuelwood.

The urban poor face different problems with respect to food utilization. Access to health, water, and sanitation services still present considerable obstacles to them, but they are more exposed to environmental contamination than the rural poor. Living in urban environment increases their exposure to illness and, especially to infectious diseases, compromising thus their capacity to utilize food adequately. Programs have been set up by USAID partners to create sustainable employment while providing for essential services, such as the provision of water and sanitation services and the maintenance of urban irrigation canals. Such programs should be continued and expanded, as they may solve problems that have otherwise proven difficult to tackle, while generating self-sustaining jobs. Urban programs should, however, sharpen their focus on women, whose role changes as they move from rural to urban living. Women in urban areas tend to work more outside the home, therefore they are more exposed to the tradeoffs between their wage earning and care-giving roles. Support to care-giving should be introduced as part of urban work programs. Also specific education messages to improve maternal feeding practices should be

developed for women in urban areas. Interesting models exist (e.g. in Guatemala City) that could be emulated in this respect.

In addition to the problems described above, Madagascar regularly experiences natural calamities that seriously compromise household food security. Three main types of **disasters** cyclically strike the island: pest infestations (mainly locusts), cyclones (and their subsequent floods), and drought. To these, one must add cholera, which appeared in the late 1990s and resulted in more than 2,300 deaths thus far. How the Mission should approach those problems varies with the type of disaster, their geographic location and the institutional response already in place to address the problem. With respect to **locust infestations**, the response usually involves early warning and preventive spraying. Activities in those areas are focused on the southern part of the country, where the problem typically emerges before it spreads to the rest of the island. Since the South of Madagascar is not a traditional area of intervention for the Mission and its partners, it is recommended that the US supports ongoing initiatives—which are spearheaded by a variety of other donors, including the European Union and the French Cooperation—rather than take a lead role. Specifically, the Mission may help by supporting the development of biological control methods (an area where the US have a comparative advantage), and by assisting financially the national institutions that coordinate anti-locust campaigns.

In contrast to locust infestations, which stand geographically outside of USAID focus areas, **cyclones and floods** frequently affect regions where the Mission and its partners are active—namely in the eastern central, western central and southeastern portions of the highlands, and along the eastern coast. The potential impacts of cyclones and floods on peoples' food security are severe. Cyclones destroy not only their crops but also their homes, and the local infrastructure—warehouses, markets, roads, electrical lines—that support their productive undertakings. The floods that often follow from cyclone lead to water contamination, at a time when the availability of health services and medical supplies is compromised by the destruction of the transport infrastructure. Activities to address cyclone damage include strategies for early preparedness (cyclone-proofing of homes and infrastructure); training of the population in disaster management and response; and relief activities when the problem reaches catastrophic levels. USAID and its partners have provided strong support in all these areas in the past and many development partners now include emergency preparedness, prevention and mitigation elements in their program. The Mission also has a well-developed emergency disaster management strategy. Those elements should be maintained. In addition, slight changes could be made to the process of call-forward of Title II commodities so that the food pipeline is fullest during the cyclone season. This would offer the possibility to make relief food quickly available to disaster-stricken populations, if the need arises.

Droughts, finally, also affect mainly the South, although some areas in the center of the island are vulnerable to prolonged failures of rain. Unlike cyclones or floods—which are sudden—droughts can be forecasted through early warning, and dealt with in a measured fashion. The Government and its partners (including USAID) have made much progress in recent years in predicting food scarcity due to water stress, and in addressing the population's needs with the help of the international community. As for locust infestations, the USAID Mission will best help by maintaining its financial contributions to national action coordinating bodies; and by responding punctually to occurrences within its focus areas.

In summary, it is recommended that USAID addresses food security in Madagascar along the following parameters. First, food security interventions should target the groups that are considered most vulnerable to food insecurity—children under the age of two, women, and communities vulnerable to disasters—particularly communities found in areas of cyclonic activity. Communities in fragile eco-regions should also be targeted, as the management of resources in such areas have effects well beyond community boundaries, potentially affecting the populations of entire eco-regions. Second, it is recommended that a concern with enabling and empowering the food insecure cross-cuts all the activities supported by the Mission, so they are able to take advantage of the opportunities that are offered to them. This cross-cutting theme effectively places education and skills acquisition, health, and safety nets/risk management at the center of all the interventions to be developed by USAID/Madagascar and its partners.

In terms of food availability, the Mission should pursue a three-pronged strategy. (i) Food availability should be pursued at the national level by supporting food policy analysis, particularly in the areas of domestic food production, food imports and national food balance sheet. This will be especially important, given the predicted growth in the national food gap over the coming decade. (ii) In regions where food markets can be supplied on a year-round basis, food availability should be pursued by supporting a diversification strategy that stimulates regional market exchanges, supports a division of labor based on regional comparative advantages, and foments overall economic growth. (iii) In remote areas the availability of food should be fostered by promoting local self provisioning strategies, while the infrastructure necessary to establish market linkages is being established. In those remote regions, the opening of trade links, market structures and storage facilities should accompany efforts at intensifying staple crop production, and a progressive shift towards a more diversified cropping pattern should be envisioned as market alternatives become available. In all regions, finally, disaster management plans should be devised to address contingencies and facilitate rapid response, while family planning activities should be conducted to contain the demand for food at the aggregate level.

Recommendations to increase food access dovetail with those meant to improve food availability. In regions with good market access, crop diversification and agricultural intensification will be pursued in order to increase both food crop production and the incomes generated through market sales. The particular situation of small farms with limited access to prime crop land must be considered, as these shelter a large proportion of the rural poor. Improved technologies and better extension programs are needed for food crops such as upland rice, maize and manioc, which are more important to the rural poor than irrigated rice. For cash crops, such as vegetable and tree crops, market information systems will be required, as well as adaptive research and extension. For all crops the availability of inputs need to be addressed, while the provision of credit and risk insurance should be considered as priorities. It is expected that increased demand for seeds, fertilizers and other inputs will stimulate the emerging input market, and allow to reduce direct and transaction costs.

To achieve a better utilization of food, the Mission and its partners must maintain their focus on the most vulnerable groups—women and children under two years of age—while continuing to promote the set of core, high impact interventions already defined. Evidence from recent surveys (DHS, EPM) point to areas where most progress remains to be done.

CHAPTER 1: THEORETICAL AND METHODOLOGICAL CONSIDERATIONS IN THE DESIGN OF FOOD SECURITY INTERVENTIONS

This paper is concerned with food security. Food security is not a standalone condition—it cannot be addressed in isolation from poverty or from the process of economic growth. To open this document, therefore, it will be useful to explore the domains covered by these respective notions, how they differ, and how they relate to one another. Particularly, the debate on the relationships between poverty reduction and economic growth will interest us in this introduction, as the arguments invoked crystallize the key options on how to best serve the needs of the poor. There is no equivalent debate on the issue of food security but the basic arguments for food security are, we believe, well represented by the notion of poverty reduction¹ and need not be developed separately.

Having identified the priority target groups for poverty reduction and food security actions—the poor and the food insecure—we then move to an examination of the options opened to decision makers in terms of interventions. The USAID Food Security Conceptual Framework is examined in terms of its priority programmatic areas. We then conclude the chapter by examining how the considerations that emerge from the poverty reduction/ economic growth debate, and the concern with food security, translate into effective programming, particularly in terms of specifying the types of interventions and the specific target groups.

The Relationship Between Poverty and Economic Growth

The definition of poverty initially focused on command over market-purchased goods (income). For instance, Rowntree's 1910 standard formulation posited that poverty is “the state of one who lacks a usual or socially acceptable amount of money or material possessions” (quoted in Fisher, 1996). Such a focus on income naturally leads to focus on the aggregate expansion of per capita income—national economic growth—as the best strategy to reduce poverty. But growth in national income only helps the poor if they share in that growth. Social inequality, a usual correlate of poverty, may defeat entirely the benefits of growth to the poor. In fact, inequality has a tendency to increase with growth unless specific measures are taken (Kanbur and Squier, 1999). Development economists proposed in the 1950s that this worsening may be transitory, and hypothesized that the relationship between growth and poverty was U-shaped: things may have to get worse before they improve—a postulate known as the Kuznets curve. Thus, a lag may be normal before redistribution starts to occur. We know enough today, however, to safely reject the Kuznets hypothesis: inequality was empirically shown to be highly resistant to change—there is simply no solid evidence on rapid decreases in inequality, no matter the level of per capita income, or its rate of expansion. Where inequality has changed rapidly, it has increased (Li, Squier and Zou, 1998). In and of itself therefore, economic growth does not magically redress inequality and reduce poverty. This does not say that growth is bad for poverty

¹ Indeed, we argue that addressing food insecurity and addressing poverty essentially leads to the same actions. The notion of food security is however more specific than poverty as it refers to food (i.e. to actual commodities that are produced, transported, prepared and consumed) and to nutritional requirements (i.e. to a physiological necessity with objective boundaries). This makes the programmatic elements and the outcomes of food security programs concretely observable, unlike poverty.

reduction; but it affirms that, unless specific measures are taken to reduce inequality, growth may have no or even regressive effects on the poor.

The challenge therefore is to identify redistributive policies that increase growth while yielding tangible benefits to the poor. The range of measures that have been taken to reduce inequality is wide: in the 1970s, schemes that focused on the direct redistribution of wealth—land reforms, collectivization and the like—were attempted in many developing countries. As we well know by now, those direct redistributive methods proved quite intractable: resistance to wealth redistribution by the non-poor, and large inefficiencies in the mechanisms of redistribution ended up either creating social stalemates (Central America), or inducing negative economic growth (sub-saharan Africa). Another approach has consisted in addressing the characteristics that result in marginalization and poverty—illiteracy, ill health, powerlessness and the like—and to remove such bottlenecks to individual development. This evolution of thought was paralleled by an expansion of the definition of poverty to embrace other dimensions of well being such as longevity, literacy and health. For instance, the 1980 World Bank Development Report redefined poverty as a “condition of life so characterized by malnutrition, illiteracy and disease as to be beneath any reasonable definition of human decency.”² Later, as findings from participatory assessments came in, the concept of poverty was expanded further to reflect a concern with vulnerability and risk, and with powerlessness and lack of voice (Kanbur and Squier, 1999:1).

Those successive revisions of the concept have not, by and large, changed significantly who is counted as poor—not a surprise since those various aspects of poverty are usually closely correlated. But the deeper understanding of poverty expanded the range of programs that are relevant to the fight against poverty. Moving beyond income to include health, for instance, introduces a new set of policy instruments. Less obvious but as important, the claim is that the discrete impact of individual programs more than adds up because the various facets of poverty are so closely interrelated. Improving health increases income earning potential; increasing education favors health outcomes; providing safety nets allows the poor to take advantage of high-return, high risk opportunities, and all of this contributes to growth. Conversely, without those building blocks the poor are unable to take advantage of income-earning opportunities that come with growth—and society fails to capture their potential contribution. From this perspective, a poverty reduction strategy that does not give a central role to equity-improving growth is likely to be both inefficient in its allocation of resources and ineffectual in its impacts.

Proponents of the broad-based “pro-poor” growth promotion thus suggest that an essential step in reducing poverty consists in reducing the bottlenecks associated with human development—health, literacy and safety nets. They concede that it may take longer for aggregate measures to show impact—a short term cost may be a reduced rate of economic growth at initial stages—but this will yield greater benefits in terms of long term, making economic growth more robust and more sustainable. The situation of the poor will also have shifted to a higher plane, from where they will find it possible to move out of their condition (Kanbur and Squier, 1999; Ravallion and Datt, 1998). Some of the cross-linkages that lead to such effects are as follow:

Education is critically linked to all aspects of development. With respect to personal income, education raises the earnings of men and women across the board, even those who are employed

² Note the shift here from Rowntree’s *relative* definition to a definition based more on *absolute* standards.

in agriculture or the informal sector. Finishing primary schooling for instance raises the income of women in the informal sector of Conakry by 30 percent (Glick and Sahn, 1999). Higher incomes ensure the ability of parents to send children to school, thus inducing self-sustaining momentum. Education also has strong positive associations with health. This occurs because education enables individuals to obtain and process information (Kanbur and Squier, 1999; Glewwe, 1997). A healthy, well nourished person can work more, earn more, invest and consume more and save more, ensuring future nourishment and work capacity. All of this supports economic growth.

With respect to health, there is an extensive literature that shows how health and nutritional status positively impact on wages and productivity. Fogel's seminal work on European history illuminated the benefits of improved health and nutrition on workers' productivity and income (Fogel, 1994). Moreover, it has been shown that those impacts are greater for the poor than the non-poor (Strauss and Thomas, 1997).³ Better health and nutrition also have positive effects on the capacity of children to learn (Pollitt, 1994). The combined effects of better health and education on growth were already described.

The existence of risk insurance and safety nets also support critical links in the web of development. Being poor is not just having little, it is also being vulnerable to losing the little one has. Lacking the means to protect themselves against contingencies, the poor face difficult tradeoffs when they have to decide whether to accept risk that could lead to disastrous fluctuations in consumption, or to minimize risk in ways that perpetuate poverty. Opting for risk-avoidance behaviors—often the road taken—is not conducive to investment, expansion and growth. In India for instance, households that are more vulnerable to income shocks devote a smaller share (9%) of their land to risky, high yielding variety crops than households with better access to coping mechanisms (36%) (Morduch, 1990). The poor are thus locked in low-risk, low return activities. Risk insurance schemes—micro-credit, crop insurance, etc—could expand the range of options open to the poor and position them to take better advantage of strategies to reduce poverty, such as education, health or income earning opportunities. However, those risk insurance schemes are typically unavailable to the poor—for instance, the administrative cost of micro-lending is high, and borrowers who have little collateral have low liability profile. Hence institutional lenders typically show little interest, unless the scheme is subsidized—which is why the provision of safety nets and insurance schemes have been traditionally perceived as a public good function. This may not remain so: group lending approaches such as developed by the Grameen Bank in Bangladesh do offer alternatives. Also, interesting variations on crop insurance schemes are being developed to address specifically the needs and capabilities of the poor, while remaining attractive for private investors (Hazell, 1998).

More recently, power, ownership and participation—we subsume those under “voice”—have also emerged as key determinants of success in poverty reduction interventions. Although the relationships are less clear than for other development interventions, a growing wealth of case studies and econometric evidence can be found to support the view that “voice” matters. To cite

³ Strauss and Thomas (1997) show that controlling for a range of factors taller men in the U.S.A. earn more—a 1 percent increase in height is associated with a 1 percent increase in wages. The same relationship for Brazilian males is much more powerful—the same 1 percent increase in height implies a 7 percent increase in wages. The authors conclude that improvements in health do result in increases in productivity and wages and, more importantly for present purposes, the “effects are likely to be greatest for the most vulnerable—the poorest and those with little education” (quoted from Kanbur and Squier, 1999:14).

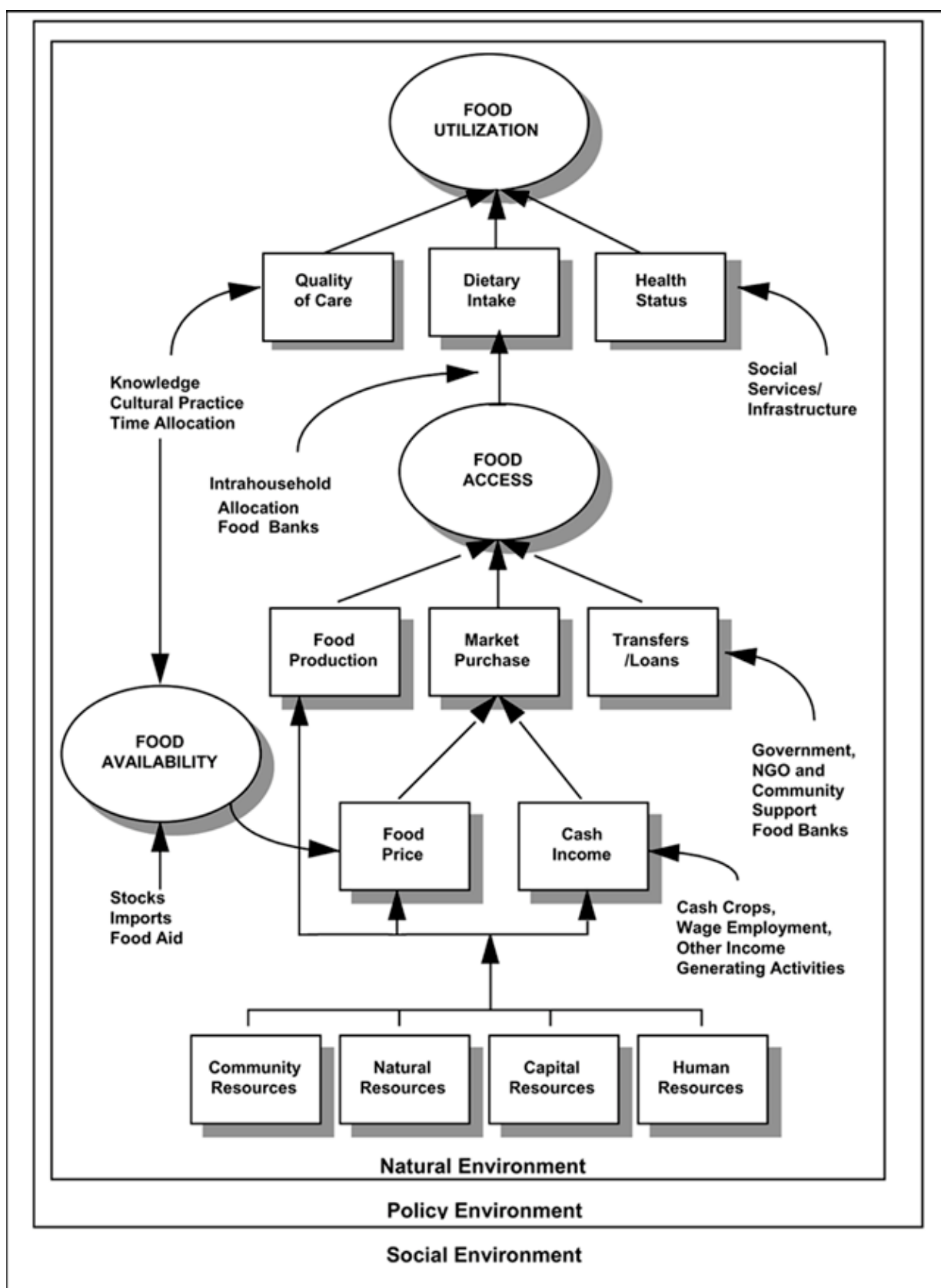
only a few, in a study of 121 rural water supply projects in 49 countries, Isham, Narayan and Pritchett (1994) found that seven out of every ten projects succeeded when the intended beneficiaries took an active part in the project design, but that only one in ten succeeded when they did not. In a World Bank study of 81 programs, fifteen of the sixteen projects where local ownership was considered high were considered successful, whereas of the seventeen programs where local ownership was low, only three were successful. Such evidence strongly suggests that giving more say to the poor increases the effectiveness of programs.

To focus on enabling individuals does not imply neglect for other areas of development. Agriculture, infrastructure, markets and communications remain key elements of any comprehensive approach. The point is that the poor must be empowered with literacy, with health, with safety nets and with voice as other developmental processes take place, so they are capable of responding to the opportunities presented to them. In the following section, the types of programs that are typically pursued under food security initiatives are examined.

The USAID Food Security Conceptual Framework

USAID defines food security as “when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life” (USAID, 1995). Achieving adequate food security is viewed as a critical step toward the more general development objectives of poverty alleviation and sustainable, broad-based economic growth. By definition, food security is a broad and complex concept, determined by a range of factors—agro-ecological, social and economic. For this reason, there is no single, direct measure of food security. Instead, the general concept of food security is divided into three distinct dimensions: food availability, food access and food utilization (see Figure 1). According to the definition:

- *Food availability* is achieved when sufficient quantities of food are consistently available to all individuals within a country. Such food can be supplied through domestic output, commercial imports, existing stocks or food assistance.
- *Food access* is ensured when households and all individuals within them have adequate resources to obtain appropriate foods for a nutritious diet. Access depends on the income (in cash or in kind) available to the household.
- *Food utilization* is the proper biological use of food, requiring a diet providing sufficient energy and essential nutrients, potable water, and adequate sanitation. Effective food utilization depends in large measure on knowledge within the household of food storage and processing techniques, and on basic principles of nutrition, child care and illness management.

Figure 1. Food Security Conceptual Framework

As suggested by Figure 1, each dimension of food security (availability, access and utilization) may be affected by a range of factors.

- *Food availability*, when considered at the *national level*, is affected chiefly by the national economic context, itself a function both of international economic flows and of domestic macroeconomic and food policy decisions, including imports and food aid. Food availability, when considered at the *sub-national* level (regional or local), depends on the existence and conditions of internal food markets, themselves a function of (among other things) food supplies at the regional level, road and market infrastructures, and population demand.
- *Food access* is influenced by household production—which calls into question issues related to agricultural technology, land distribution, education, access to capital markets and the availability of inputs—and by household income, which depends on the general microeconomy—labor markets, supply and demand, product markets.
- *Food utilization* is premised on appropriate food intake, but also on the physical health of individuals, on the knowledge of caretakers, on access to safe water, on cultural beliefs with respect to food, on the prevention of epidemics, on reproductive health and family planning.

In short, food security is an outcome that may be influenced by a wide array of development interventions. In a situation of adequate availability, most immediate impacts on food security will be achieved by increasing agricultural productivity, raising household incomes, and improving household nutrition, especially for children and mothers. However, the natural and socio-economic context in which food security interventions are undertaken often predetermines their long term impact and durability. Thus, other interventions that affect those predetermining conditions may be considered to influence food security as well.⁴ Table 1 provides examples of the main factors that relate to the various dimensions of food security, and the types of interventions that may be undertaken to affect those dimensions, either at the immediate (proximal) or underlying (distal) level.⁵

⁴ This is an area where the integration of resources within USAID is critical: while CAs and Title II CSs generally operate at the field level, the USAID Mission has entry at the highest levels of government. It can use its influence to affect some of the predetermining conditions—e.g. the regulatory framework—to create the facilitating environment in which local food security operations will succeed.

⁵ Note that interventions may simultaneously affect more than one dimension: for instance, interventions that improve agricultural productivity affect both households' access to food, and the aggregate availability of food. Likewise, family planning, which results in less mouths to feed, affects both food utilization at the individual level, and food availability at the aggregate demand level. Hence the dimensions of availability, access and utilization are not mutually exclusive—the subdivisions are mainly useful for organizational purposes, and should not be construed too rigidly.

Table 1: Factors and Interventions Associated with Food Security

Factors related to food availability at the national level	Activities affecting aggregate demand and supply
International prices (food imports and export of tradable goods)	Macroeconomic policies (liberalization, exchange rates, etc)
National food supplies	Domestic economic policies (sectoral investments), food policies (imports, food aid)
Factors related to food availability at sub-national level	Activities affecting internal demand and supply
Transport infrastructure	Road construction and maintenance
Markets	Communications, prices, commercial credit, food storage
Population size and demand	Family planning
Factors related to food access	Activities affecting household level production and incomes
Agricultural productivity	Research and extension, irrigation, human capital formation etc.
Access to factors of production	Land, credit, input supplies, labor markets etc.
Natural Resources protection	Reforestation, watershed protection, sustainable agricultural practices
Post harvest handling	Storage, food transformation technologies
Micro-enterprise development	Micro-credit, farm sales, Income Generating Activities (IGA)
Factors related to food utilization	Activities affecting individual capacity to utilize food
Maternal and child health and nutrition ⁶	Micro nutrients supplementation or fortification, nutrition education, behavior change, child survival, prenatal care etc.
Provision of health services	HIV/AIDS, family planning, immunization campaigns, deworming etc.
Water and sanitation	Water and sanitation education, wells/latrine construction etc.

Targeting food security interventions

It is quite natural that the targets of poverty reduction programs be the poor themselves. Should “the poor” as a whole also be the target of food security interventions? The relationship between poverty and malnutrition, for instance, although potentially strong, is not linear. If families do not spend their increased income on the factors that determine good nutrition—better food, care and health—then the reduction of poverty is unlikely to decrease malnutrition. Increased income may also fail to enhance nutritional status if women and men have to work longer and harder to get that income, thus providing less care to children. Such potential disconnects between poverty and nutrition means that poor people are not always malnourished, and malnourished people are not always poor (Haddad and Alderman, 2000). And whereas all the poor can potentially benefit from food security programs, the particular nature of food makes particular subsets within the poor—those most likely to suffer from food deprivation—emerge naturally as priority targets for food security interventions. At the individual (food utilization) level, this includes mainly women and children under two years of age. At the household (food access) and regional (food

⁶ Note that health and nutrition interventions are important components of utilization for all household members. The focus, however, is given to mothers and young children because they are most vulnerable, and because malnutrition in those groups has lasting effects on future generations.

availability) levels, this includes mainly the households that are most vulnerable to random shocks, and communities that are susceptible to disruption in their food supply. Finally, at the regional level, biodiverse eco-regions are targeted to protect the current and future food production capacity. The target groups described above combine in suggesting geographic focus for food security interventions. The rationale for proposing these groups as targets for food security interventions is briefly reviewed below.

Children under two years of age

The nutritional status of an individual is in a large measure determined during the first years of life, when the most critical periods of growth take place. Most of the functional impairments resulting from malnutrition are inflicted before two years of age. Once a child reaches two years of age, the damages from impaired growth will be permanent thereafter and will carry through the life of the individual, hampering his/her work capacity and learning abilities. The capacity of a malnourished child to move out of poverty and food insecurity later in life will already be reduced.

Women

It is now known that women are often disadvantaged when food and nutrients are distributed within a household. IFPRI studies of intra-household food distribution in South Asia showed strong gender bias against women who received less food and food of lesser quality than preschool boys, even though they have greater energy and nutrient requirements (IFPRI, 1998). The consequences of maternal malnutrition go beyond the impact on women as individuals. Growth faltering in children begins before birth, starting in-utero; and the surest way to improve fetal nutrition and to break the inter-generational cycle of malnutrition is to improve the mother's health and nutrition. There are many other good reasons to target women. Improving women's conditions, particularly their education and status, will have much greater impact on the wellbeing of the other household members than when focusing on men. Consider the following:⁷

- Agricultural productivity increases dramatically when women get the same amount of inputs men gets. It was shown that when women get the same levels of education, experience and farm inputs that currently benefit the average male farmer, they increase their yields by up to 24 percent compared to men (Quisumbing, 1996; Udry et al, 1995).
- Increasing women's human capital is one of the most effective ways to reduce poverty: studies in Egypt and Mozambique showed that getting women to complete primary school reduced the population below the poverty line by up to 33.7 percent. In both these studies female education had a much larger impact on poverty than other factors, including male education (Datt and Joliffe, 1998; Datt et al, 1999).
- Increasing women's assets raises investments in education and girls' health: The assets controlled by women play a significant role in household decision making, particularly in the allocation of household expenditures to education, clothing and health—particularly girls' health (Quisumbing and Maluccio, 2000).

⁷ Most of the findings proposed here are summarized by Quisumbing in IFPRI, 2000.

- Women’s education and status within the household contribute to the reduction of child malnutrition: A meta analysis of factors that helped reduce child malnutrition identified increases in women’s education as the largest contributor to reduced malnutrition—accounting for as much as 43 percent of the variation. Improvements in household food access came in a distant second to women’s education, contributing 26 percent to the rate of reduction (Smith and Haddad, 2000).
- Improving child care practices powerfully mitigates the effects of poverty. A study in Ghana showed that better maternal care practices can bring the height for age measurements of children from poorer families up to the level of children from wealthier families, or to the level of children with more educated mothers (Ruel et al, 1999).

Those findings show that women are truly “the key to food security” as Quisumbing (2000) puts it. Improving maternal nutrition, protecting adolescent girls’ growth and empowering women through education and better nutrition knowledge will have a greater impact on food security and nutrition than any other intervention, because of the linkages it creates in all directions—in education, in health and nutrition, and in food production.

Households Vulnerable to Disasters

In a country like Madagascar, where three out of four households are considered poor, the idea of targeting may appear moot. Vulnerable households are found everywhere, submerging a minority of less vulnerable units. What criteria should one use to demarcate between households? The risk of introducing inefficiencies (leakage of benefits to non-poor), inequities (is a family just above the poverty line truly better off than those who stand just below that line?), plus the typical errors of omission and commission⁸ associated with targeting, can make such targeting both ineffectual and unfair. Yet, resources are limited and there are households who are more vulnerable than others to food insecurity, and who suffer disproportionately from fluctuations in their livelihood strategies. In Madagascar, the likelihood of disasters—drought, floods, cyclones, pest infestations—is very high (see Chapter 6) and the damages inflicted by a disaster on the household economy may represent the greatest threat to households’ fragile equilibrium and their capacity to access food. The effects of a disaster reverberate for many years on those households, representing often the push that will send them permanently into poverty and food insecurity. For that reason it will be convenient to identify households that live in regions frequently visited by natural disasters as a priority target group.

Biodiverse ecoregions

A final target group are eco-regions with high biological diversity. The USG Foreign Assistance Act (FAA, Sections 118 and 119) requires its agencies to place a high priority on the sustainable management of tropical forests and the conservation of biological diversity. In accordance with this act, each country development strategy must include an analysis of (i) the actions necessary in that country to conserve biological diversity and achieve conservation and sustainable management of tropical forests, and (ii) the extent to which the actions proposed for support by the agency meet the needs thus identified. Apart from this regulatory requirement, the protection of forested areas and of bio-diversity is critical to the food security of the population living in

⁸ An error of omission is to fail to include a household that should have been included. An error of commission is to include a household that should not have been included (Mason et al, 1984).

eco-regions, not only in core forest and bio-diversity zones themselves but also in the downstream and tributary areas of those zones. Forests and bio-diverse areas can be protected by promoting environmentally friendly economic activities to people already established in those areas, and by reducing the incentives for others to migrate into those areas.

CHAPTER 2: GENERAL OVERVIEW OF MADAGASCAR

Madagascar, the fourth largest island in the world, is a country of unique biological diversity. Located along Africa's southeastern coast, the island stretches over 1,600 km from North to South, and spans 650 km at its widest point. The island's surface area is 594,180 sq km, more than twice the size of the UK. Its highly varied landscape divides generally into three parallel zones running north-south: the low plateaus and plains in the west; the high plateau in the center, with altitudes ranging from 750m to 3000m; and a narrow coastal plain in the east. Climate is tropical with a rainy season stretching from November to March. This broad climatic classification, however, hides significant differences between regions. Rainfall ranges from around 300mm annually in the dry south west, to over 3,600 cm annually on some portions of the eastern escarpment. Temperatures also vary considerably from the high plateau, where it can drop to -15C during the winter months, to +44C in coastal areas. During the rainy season, and up into April, the island is subject to frequent cyclones which inflict considerable damages. Cyclones hit mainly the coastal areas and usually do not reach the central plateau where the capital is, but they can bring week-long periods of constant rains in the highlands.

Madagascar has a unique flora and fauna and many of the species found on the island are found nowhere else. The island gave the world such products as clove, vanilla, ylang-ylang and many other less known species. Such products have always attracted traders and long-distance navigators. Madagascar's first permanent inhabitants were Malay sailors, who arrived around the 6th Century AD. Settling mainly in the high plateaux, those early visitors brought with them their traditional culture, including the cultivation of rice and the irrigated terraces that, still today, remain as defining elements of Malagasy culture. Other people of Bantu origin arrived shortly after the Malay from the shores of East Africa, establishing their homes along the coastlines. They added their own culture to the nascent Malagasy society. Today, although the language is unified, there are 22 ethnic groups, usually referred to as clans.

Currently, the country is politically divided in six "faritany" (provinces),⁹ 110 "Fivondronana" (prefectures) 1,252 Firaiana (communes) and approximately 11,000 Fokontany (population blocks, the smallest administrative unit)(see Map 1). Agriculture, including livestock rearing, fishing and forestry, is the mainstay of the economy, involving 70% of the active population, accounting for 34% of GDP and contributing more than 70% of export earnings. Industry, which accounts for 12% of GDP, features textile manufacturing and the processing of agricultural products. The service sector generates the remaining 54% of GDP. Main exports include coffee (45%), vanilla (20%), cloves, shellfish, sugar and petroleum products (World Factbook, 2000).

In 2000, the total population in Madagascar was estimated at 15,5 million of which 22.2% lived in urban areas. The annual population growth rate for 1999 was estimated at 2.8%. More than two-thirds of the Malagasy population is considered poor and food insecure (World Bank, 2000). Sixty percent are considered extremely poor and not having enough to eat. Forty eight percent of the children under three years of age are stunted (-2 zscores of height for age using NCHS standards) with figures being slightly higher in rural areas according to the Periodic Household

⁹ The six "Faritany" of Madagascar are Toliary, Toamasina, Fianarantsoa, Mahajanga, Antsiranana, and Antananarivo.

Survey (Enquete Permanente des Menages, or EPM, 1999). Access to services—electrification, latrines, potable water—is highly deficient in all rural areas.

The country also has a poorly developed transport infrastructure. There are 49,837 km of roads, of which 5,781 km are paved and the remainder (44,056 km) are unpaved (1996 estimates). Waterways are of local importance only except for small portions of the Pangalanes Canal along the Eastern coastline. Ports and harbors are in poor repair and only the port of Tamatave is able to accommodate large cargos. Ports in Antsiranana, Mahajanga, Toamasina and Toliara are operational but have very limited capacity.

The reduction of poverty and food insecurity will depend to a high degree on improving economic growth, particularly in the agricultural sector. Madagascar has considerable growth potential but formidable obstacles stand in the way of realizing it and efforts at overcoming those constraints have met with little success so far. In 1976, in an attempt to harmonize the production and consumption sectors and ensure adequate prices and supplies for all, the GoM nationalized most private enterprises, including those in charge of marketing agricultural inputs and outputs. Parastatals were created to control the collection, sale, transformation, transport and distribution of main food crops. However, those measures did not have the desired effect: the end results were to dampen producer prices, stifle agricultural growth and introduce inefficiencies in the agricultural marketing sector, all of this under unsustainably high budgetary costs. Structural adjustment reforms, including a series of currency devaluations, were introduced in 1982 which gradually removed State control mechanisms from the productive sector. These adjustments appear now to have been beneficial in some respects, particularly at the macro economic level: budgetary deficits have been reduced, the balance of trade has improved, inflation has been contained and since 1997, growth rates have remained at 4.7% yearly, above the demographic growth rate of 2.8%. The government now predicts the country will attain 6.3% GDP growth for the period 2001-2003.

However, key social sectors, particularly small farmers, do not yet show signs of sharing in this growth. Devaluation may have improved the competitiveness of the export sector on the global market, but it has also triggered a multifold increase in the prices of imported goods, putting fertilizers and other agricultural inputs out of reach for most small farmers. Further, the increases in food production costs put domestic producers at a disadvantage compared to imports, which can be obtained more cheaply. As a result, productivity and incomes in rural areas are stagnating, and malnutrition rates remain among the highest in Sub-Saharan Africa. Also, the country still depends on foreign assistance to a very large degree, receiving around US\$400 million annually from foreign donors, while internal revenue is estimated at US\$553 million. Foreign debt still stood at around US\$4 billion in 1999.¹⁰ No matter how one looks at it, and notwithstanding the progress registered in recent years, the road to improved food security and nutrition in Madagascar is still a long one.

The Institutional Context

As already mentioned, the Government of Madagascar has taken a series of steps in the last two decades to reform the country's economic structure. Two key elements of the adjustments have

¹⁰ Note that this figure will change due to a recent debt relief program by the World Bank

been economic liberalization, starting around 1982; and, more recently, the delegation of political authority to regions—decentralization. Those two processes underpin much of the subsequent policy initiatives, including the Government’s Action Plan for Rural Development (Plan d’Action pour le Développement Rural, or PADR); and the Poverty Reduction Plan (Document Stratégique pour la Réduction de la Pauvreté, or DSRP). These processes will have crucial implications for future food security interventions. We examine briefly here the reach and intent of the reforms.

Economic liberalization

The guiding principle in separating the role of the State from that of the private sector rests on the assumed superiority of the private sector in the production of goods and services. It is thus stated that “the State should provide a favorable environment for the development of private sector activities” (quoted from UNDP, 2000) and withdraw itself as much as possible from all productive undertakings. The private sector is seen to have greater flexibility than the State at a number of levels (decision making, labor contracts, etc). At the same time, it is acknowledged that some goods and services essential to development will not be assumed by the private sector—basic education, infrastructure and public health being the main ones. Five main functions are attributed to the State under those general principles:

- Maintain law and order
- Collect information on field conditions
- Combat major risks and disasters
- Provide certification (of genetic materials, licenses, products, land titles)
- Sponsor public works (infrastructure, etc).

In each of those functions, the central government should capture no more than 5% of existing resources, while the regions will retain 95% of those resources. The central structure will limit itself to interventions of national scope—policy formulation, action plans, technical assistance to regions, etc (UNDP, 2000).

Decentralization and the Action Plan for Rural Development

A governmental decree promulgated on December 4, 1997 stated that the Food Security Strategy elaborated in the context of the SEECALINE project would be adopted as the official strategy of the GoM for food security. As it turned out, however, the GoM’s Food Security Strategy was never implemented. It was superceded in 1999 by the Action Plan for Rural Development (Plan d’Action pour le Développement Rural, or PADR). The PADR is much wider in scope, providing a defining context for all rural development interventions, including those actions that target food security; while incorporating the new fundamentals of policy making, i.e. liberalization and decentralization. Specifically, the stated objectives of the PADR are to ensure food security, accelerate economic growth, reduce poverty and promote the sustainable management of the natural resources (PADR, 1999:2). To reach those objectives, actions will be taken in the following areas:

- The institutional and regulatory framework will be reformed in support of decentralization, clarifying the mandates and responsibilities of agents.
- Partnerships in rural development will be promoted, with a decreased role of the State and an increased role for local and private institutions.

- Sustainable agricultural growth will be promoted, focusing particularly on reducing the incidence of slash and burn, on increasing the titling of land, and on building local users' capacity to maintain public infrastructures.
- Regional food security will be promoted, focusing on improving rural transportation and emergency preparedness.
- Access to social services, including, water, health, and habitat will be increased.

To support the implementation of this Plan, the GoM has proposed a new subdivision of the country based on regions. Twenty such "regions" are defined in the Plan.¹¹ They are not political entities, in the sense of having a clear hierarchical and administrative superstructure but they will be the seat of the local rural development work groups (Groupe de Travail du Développement Rural, or GTDR), through which the Plan will be enacted. The GTDR are defined as a regional forum regrouping five main stakeholders: decentralized services involved in rural development; decentralized authorities; NGOs; operational agencies; and producer organizations. The structure is expected to be representative, participative, and capable of identifying the constraints and comparative advantages particular to their region. Thematic areas to be considered by the GTDR will include rural security, tenure security, peasant organizations, micro credit, income generating activities, and research (SPPM, 2000). Most development actors ((UNDP, EU, WB) have already inserted these new structures into their intervention design, and now work within the PADR and regionalization concepts. If this trend is confirmed, the GTDR will likely become a key interlocutor of the decentralization process, and the main body in charge of coordinating development activities at the local level. As a mediating instance, thus, the GTDR will have to be considered by any development actors.

As a whole, the PADR document was generally well received,¹² although it is recognized that it lacks precision in terms of priorities, modes of implementation and role given to the private sector. The World Bank is currently working with the GoM in clarifying those issues, and a final draft is expected in the Spring of 2001.

¹¹ It is not clear how many regions actually have been defined. Maps that accompany the PADR list twenty eight regions. Other documents, however, mention only twenty. We could not get final confirmation but the latter figure, it seems, will prevail in the end.

¹² Another task that the PADR has set to itself is to clean up the institutional landscape in relation to rural development. There is a plethora of institutions intervening in the rural sector, and the confusion and inefficiency that results from this situation has been pointed out by several of our informants. The public sector itself contributes in a large way to the problem: there are six Ministries who have some form of jurisdiction over rural development. Some functions, which belong to one Ministry, are overtaken by another (for instance, the Ministry of Agriculture (MINAGRI) intervening in development issues, or in rural cadaster issues). In reaction and to avoid red tape, special projects frequently become part of the Prime Minister's Office. Or else, the government creates semi-public institutions to oversee donors' investments. This may speed up implementation, but neglects long term problems, short-circuits technical ministries and reduces the sustainability of interventions. The PADR intends to address this issue, and it is hoped that the new structure will facilitate coordination between development actors.

CHAPTER 3: FOOD AVAILABILITY IN MADAGASCAR

In 1999, total yearly requirements for staples was 3,375,000 tons/year of CE (cereal equivalent). This assumes a population of 15 million inhabitants and a need of 225 kgs CE per person per year, providing 2133kcal per adult equivalent per day (FAO, 2000). Of this amount, the country directly produced 99% of its total cereal needs (Table 2). In addition, commercial imports totaled 163,400 tons of cereals (Annuaire Statistique Agricole, 2001). On the basis of those numbers, it would appear that sufficient food is available on a yearly basis to meet all of the internal demand. As we illustrate below, however, the availability of food is a problem in some regions, due to a combination of insufficient local production, maldistribution of commodities and poor access to food markets. Moreover, recent data from the Economic Service of USDA points to a future growing food gap at the national level (USDA, 2000). This evidence is reviewed later in this section.

Rice is the most important crop, with an annual production of 2,6 million tons, followed by manioc with 2,4 million tons, sweet potato with 530 thousand tons and maize with 175 thousand tons. Those crops are grown all over the country, with important regional variations in terms of area and total quantities produced (see Table 2).¹³ Looking at consumption, rice is by and large the main staple, but manioc is also very important, providing 14% of all calories consumed in Madagascar. Manioc consumption is most important in the south where it accounts for over 27% of caloric intake. Recent evidence further demonstrates the importance of manioc for poorer segments of the population for whom it is an inferior good (ie. it is not the preferred food, but it is cheaper and tends to be consumed more as people become poorer). Manioc thus plays an important role in food security, and arguments are heard to improve research and extension in manioc, which has been largely neglected by agricultural research so far (Dorosh et al, 1998).

Most domestic rice is produced by small farmers for subsistence purposes. The rice that enters the market essentially comes from a few select regions—Lake Alaotra and the Maravoay plain in particular, or from commercial imports and/or food aid. In most areas, rice cultivation depends on irrigation:¹⁴ 88% of the rice produced in the country comes from irrigated fields (INSTAT, 2001). There is still more potential for irrigation (the total potential is 1,5 million hectares) but the expansion of irrigation has proceeded at a slow pace in recent decades,¹⁵ notwithstanding the considerable investments made by the GOM and international donors.

The prognosis for future availability of food in Madagascar is not very encouraging. If the current situation of stagnant productivity persist, the food gap, assuming current per capita consumption is maintained, is projected to increase from 92 thousand tons in 2000, to 591 thousand tons in 2010 (USDA, 2000). The situation is even more alarming when one considers

¹³ The main export crops of coffee, peppercorn, clove and vanilla, are not important for food availability, but they are extremely important for the generation of smallholder income in some areas, mostly in the eastern part of the island.

¹⁴ The use of the term “irrigation” is confusing in Madagascar as much of the plots classified as “irrigated” (particularly the traditional family irrigation and micro-irrigation fields) in fact depend upon rainfall—the canals simply distribute rainwater to the fields. Such a situation is distinct from irrigation infrastructure that comprise dams and reservoirs, which stabilize water supplies over the year. Unfortunately, that distinction is rarely made in the literature, so we follow the common usage of bundling the two situations under “irrigated fields”.

¹⁵ Between 1984 and 1994, area under irrigation increased by 20% while rainfed area increased by 200%.

nutritional requirements: the gap will go from 146 thousand tons in 2000, to 661 thousand tons in 2010, if the country is to satisfy the dietary (kcal) requirements of its population (this calculation does not include food aid).

This situation has led to a fundamental re-evaluation of priorities among donors as to where investments should be directed. Until the mid-1980s, massive amounts of resources were channeled towards the large irrigated rice perimeters as a way to increase food availability. There was a strong cultural perception, actively supported by the State, that Madagascar, the country of paddy, should be self-sufficient in that commodity. However, the disappointing growth rate in rice productivity, and the increasing importance of commercial imports in satisfying national demand,¹⁶ leave little alternative but to abandon the myth of self-sufficiency in rice. Almost unanimously now, donors press for agricultural diversification based on the country's comparative advantage in international markets (see Dabat, 2000; Hirsch, 2000; Haan et al, 2000). Rice remains important, but support is increasingly geared towards improving productivity at the small holder level, not supporting large irrigation schemes. Chapter Four provides more information on efforts to improve production at the household level.

Determinants of Food Availability at the Regional and Local Levels

The most recent information on regional food availability was collected in 1993 and published in 1996 by the World Bank-funded SEECALINE project. Table 2 presents some of this data (note that, although the absolute values under each Faritany may have changed since 1993, the order between Faritany as to percent of total consumption and area is unlikely to have changed much).

According to Table 2, rice occupies 70% of all cultivated lands, and contributes most calories in all six faritany. Manioc also contributes importantly to the diet in Antananarivo, Toliary and Fianarantsoa, and appears in the latter as the most important crop in terms of total production. Maize, although not extremely important overall, provides 15% of all caloric requirements in Toliary. Likewise, sweet potato has a relatively small importance as a food staple, although it does play a sizeable role in Antananarivo, Fianarantsoa, Mahajanga and Toliary.

¹⁶ The growing role of imports is related on the one hand to the poor incentives offered to national rice producers; and on the other hand to the fact that international prices are lower than internal ones.

Table 2:

Production (in 1000 tons) in 1999, % of total consumption and % area under each food crop by Faritany

		Rice (paddy)	Maize	Manioc	Sweet potato
Antananarivo	1999 Production*	523.1	76.9	378.5	202.0
	% of total consumption	48	3	25	8
	% of cultivated area	55	22	16	4
Fianarantsoa	1999 Production*	404.4	23.2	1119.3	149.1
	% of total consumption	47	8	16	6
	% of cultivated area	47	26	5	4
Toamasina	1999 Production*	680.4	15.1	278.9	33.0
	% of total consumption	54	3	11	2
	% of cultivated area	72	15	3	1
Mahajanga	1999 Production*	548.4	20.9	123.3	11.8
	% of total consumption	64	5	7	.5
	% of cultivated area	69	12	12	1
Toliary	1999 Production*	157.9	30.6	425.8	127.6
	% of total consumption	28	15	23	5
	% of cultivated area	31	32	20	8
Antsirana	1999 Production*	246.5	8.4	58.3	6.8
	% of total consumption	67	6	3	.4
	% of cultivated area	75	4	2	0
Total Madagascar	1999 Production*	2560.7	175.1	2384.1	530.3
	% of total consumption	61	6.8	14	1.8
	% of cultivated area	70	21	11	4

Sources: SEECALINE, 1996; * MINAGRI, 2001

As shown in Table 3, four of the six Faritany meet the energy needs of their population through their local production. The fact that domestic production in those four faritany makes sufficient food available in the aggregate does not, however, ensure that everyone has access to enough food to fulfill their individual needs. As shown in Table 3, more than 67% of all the Malagasy people do not meet their energy needs. This is due to a combination of poor production and income at the individual household level (discussed separately under the Food Access section), limited market access and poor infrastructure.

Table 3:

Percent of total needs met by local production, and percent of the population not meeting its needs

	Proportion of total energy met (as % of 2133 kcal/day/person)	Proportion of individuals that do not meet their energy needs (%)
Antananarivo	102	57
Fianarantsoa	109	60
Toamasina	86	75
Mahajanga	102	67
Toliary	83	75
Antsirana	114	68
Total	99	67

Source: SEECALINE, 1996

Roads, Food Markets and Storage Infrastructure

The road network in Madagascar is in very poor condition. On average, the country has only 9km of paved road and 60km of dirt roads per 100square km. In addition, it is estimated that up to 80% of the network is in bad condition today, due to poor maintenance.¹⁷ Even where roads exist, entire regions periodically become inaccessible during the rainy season.¹⁸

The difficult access to the regions implies high transport costs, which exerts strong constraints in the supply of agricultural inputs and the marketing of surpluses.¹⁹ As a result, intermediaries tend to confine their operations geographically, and to speculate on inter-seasonal rather than inter-regional variations. Most intermediaries buy and sell in the same area, and avoid long distance trade. This fosters a dis-articulation of inter-regional markets, with poor price connections between regions, a situation that favors buyer monopolies, depresses prices to producers and lessens incentives to augment production (Badiane and Kherallah, 1997).

Regional warehousing of food could palliate to some extent the effects of poor transportation, for instance through community granaries. However, storage infrastructure are infrequent (except in a few key areas such as the production regions of Lake Alaotra and Morovay), and they mostly belong to intermediaries concerned with speculation (Badiane and Kherallah, 1997).²⁰

All of those conditions—marginal production, lack of markets, poor roads and inadequate storage—are bound to make segments of the population vulnerable to food shortages. Structural factors make food availability particularly problematic in isolated areas—the more remote the area, the costlier it is to bring food, and the more expensive it is to local consumers. At the same

¹⁷ Poor infrastructure has other negative effects on food security: it impedes access to public services such as schools, health centers, and markets; and makes it difficult to maintain official employees in remote postings, with serious implications for the quality of services available. Also, the rural insecurity (*dahalo*) problem has been related to the incommunicability of regions and the difficulty to enforce the rule of law.

¹⁸ Also, cyclones and floods occasionally inflict serious damage to the transport infrastructure, as happened along the Tanala escarpment following the three cyclones that hit the island in 2000.

¹⁹ An IFPRI/FOFIFA study that compared Madagascar to other Sub-Saharan countries showed that it costs half the time and the money to carry the same quantity of commodity over the same distance in Malawi as compared to Madagascar. The ratios are even higher compared to Senegal (Badiane and Kherallah, 1997).

²⁰ Note that this contradicts the Mission Disaster Relief Plan (MDRP) prepared by OFDA in 1999, which states that warehouses are available in all regions where strategic grain reserves can be stored for emergency purposes. We found no other data to confirm the OFDA assertion; and many informants confirmed to us the absence of warehousing facilities at the regional level.

time, these remote consumers are the least able to purchase food if production fails because they lack cash income. Vulnerability to food shortages in Madagascar is often a result of isolation. A two-pronged strategy may thus be justified to address the problem of food availability: 1) pursue self sufficiency in remote areas (at least until market access is established); 2) pursue diversification in regions where food can be transported most any time, to increase the capacity for market exchange. In parallel, family planning programs will be required to stabilize the demand for food.

Population Demand for Food

Population has been growing at a steady rate of 2.8% over the last decade. This is high: in practical terms it means that every year, Madagascar adds more than 400,000 consumers to its food balance sheet. Meanwhile, productivity in the agricultural sector is lagging behind. GNP growth may be on the way up overall, but this growth so far has benefited mainly the service and industrial sectors, both of which are largely urban-based. In agriculture itself, rice production has grown at a lowly 1.8% per annum for the last 20 years.²¹ Besides, all increases in food supplies have come from the extensification of production, not from intensified agriculture.²² The difference between production and consumption means that every year, the equivalent of an additional 150,000 people would not have any food to meet their needs. Unless additional food is made available to households from alternate sources, individual food shares have to be reduced every year because that food is not available. Here again, imports and food aid may appear to compensate at the aggregate level, but it is by no means clear that this additional food can reach the population in remote areas, where it is most needed.

This issue is complex as it is linked to agricultural production technology; infrastructure; the environment; household incomes; and population growth. Production, income and environmental issues are discussed under the food access section. Population growth is addressed in the Food Utilization section, under Family Planning.

Actions Undertaken to Support Food Availability

The GoM is fully conscious of the constraints imposed on growth and poverty alleviation by the current economic structure. It has taken major steps over the last twenty years in this respect, as attested by the series of structural adjustment policies adopted by the State. The IFPRI/FOFIFA studies on the effect of those policy adjustments mention that those measures have succeeded in removing most of the past policy barriers related to agricultural production and trade. Yet “the agricultural sector is still stagnant and the long term decline in productivity in income per capita does not seem to have been reversed” (Goletti and Rich, 1998:1). According to most analysts, the key macro economic structural determinants have been put in place. It is the micro-economy that now needs adjustment. Efforts must concentrate on improving the efficiency of the current structure by identifying and removing the bottlenecks to growth. According to Goletti and Rich (ibid), those bottlenecks (and the poor response of farmers to national economic growth) relate to

²¹ This is not taking into account growth in the agro-export sector, which is important. Agro-export growth is confined however to producer regions in the eastern and northeastern parts of the country, and represent a relatively small fraction of the total rural population.

²² In the absence of intensification any change in overall production levels imply an increase in land clearings, which has consequences for the environment.

the lack of investment in key areas such as research, extension, infrastructure, resource degradation and rural institutions (including land tenure and rural credit).

The issue, then, is how can those bottlenecks be removed? The areas mentioned here have traditionally been defined as public goods to be provided by the State. The reduction of national budgets and the withdrawal of the State from the productive sector, however, forces a redefinition of the notion of “public goods” so it identifies the potential contribution of the private sector and of civil society in providing for them. For instance, civil society can play a crucial role in mobilizing local resources for infrastructural works (roads, grain storage, markets) through cost-share investments in association with the State, the donor community and the private sector. Under the current scarcity of funds, this type of creative initiatives will be critical in reducing the bottlenecks to sustainable economic growth and in expanding the range of income opportunities open to the urban and rural poor and thus, deserves to be studiously examined and promoted.

Furthermore, there is no doubt that under certain conditions, the private sector can play a much expanded role in development. It can provide the technical know how, agricultural extension and credit needed to increase farmer output. Expanding farmer’s output in turn increases agribusiness’ capacity utilization and competitiveness, thus contributing to overall economic growth. Agribusiness can thus realize a profit by providing services previously defined as “public goods”, while farmers benefit from improved access to input and output markets, knowledge and market information. Options are presented throughout the document—see sections on micro-credit, risk insurance, education, and extension for instance—that take advantage of opportunities for privatization.

However, development agencies must also recognize the limitations of market driven development. This is particularly critical when considering the aims and targets of a food security program. The food insecure often live in isolated or marginal areas that present little commercial interest and comparative advantages for private operators. Hence the responsibility for development cannot be left to the private sector alone. The non-poor may help create opportunities in some settings, but one should never forget that the goal of a food security or poverty reduction program is to foster the benefit of the poor and the food insecure, not the non-poor (Sen, 1999). Supporting the interests of the latter should be considered only when it is instrumental in reaching the former.

Another issue that must receive attention is the question of irrigation in the large irrigated perimeters. Forty percent of the 2.5 million hectares currently cultivated are irrigated.²³ Seventy percent of all agricultural production, and 88% of rice comes from irrigated fields (Haan et al, 2000:8). However, as was mentioned earlier, production in areas under irrigation is increasing very slowly compared to rainfed area. The constraints are linked to land access, and to the cost of infrastructure. Policy studies and recommendations are needed on the costs and benefits of irrigation investment, taking into account the particular dynamics of the agrarian sector and current trends in land distribution. Irrigated rice will undoubtedly remain important, both as provider of foodstuff to national consumers and as a key source of food and income for

²³120,000 has in large perimeters; 170,000 has in small perimeters; 500,000 has in micro-irrigation schemes and 300,000 has in traditional family irrigation (Haan et al, nd:8)

the small farmers. However, the satisfaction of national and regional needs in the short term may depend more on improving the capacity of farmers to produce enough food and income for themselves and on compensating for urban consumption through imports, than on seeking an ever more elusive self sufficiency in rice through investment in large-scale irrigation (Hirsch, 2000; Gaudreau, personal communication). In the middle term, as rural infrastructure and market linkages are developed, the availability of food should be fostered by promoting local self provisioning strategies while also diversifying small holder production so they can take advantage of the commercial opportunities likely to develop once market linkages are established.

With respect to transportation infrastructure, traditionally viewed as the public good *par excellence*, the GoM is proposing actions in the short and middle term to reduce the isolation of rural populations and increase their insertion in the market. These measures include the adoption of a transportation policy in rural areas (PTMR, or Politique de Transport en Milieu Rural) that will oversee 1) the rehabilitation or construction of feeder roads to improve access to markets, health centers, schools and other public services; 2) the rehabilitation or construction of port installations; 3) the promotion of rural markets, community grain storage structures, rural electricity and potable water systems; and 4) the strengthening of communities' technical capacity in general public works (SPPM, 2000).

Given the current level of restrictions on government spending, however, and the extremely high costs of building and maintaining roads, it is clear that creative financial approaches will be needed if those ambitious goals are to obtain. One avenue that has been little explored but may recel potential is a cost-share model involving joint actions by the State, international donors and their NGO partners, civil society and the private sector, to link markets and producers and thereby fostering input/output movements, competition and productivity.²⁴ Donors and their NGO partners can provide technical, organizational, financial, and in kind (for instance, food for work²⁵) resources; whereas civil society can mobilize labor, materials, funding; while the State provides a coordinating and regulatory role, in addition to contributing its existing equipments and expertise. The private sector finally can play a key role where commercial interests are present, as was shown in other contexts.²⁶

USAID has played an important role in the past in funding food policy studies to better understand the situation and the options available to policy makers. Goletti and Rich (1998) simulated the costs and benefits of alternative policies aiming at removing the constraints to growth in the rice sector. They conclude that investment in research and extension (R&E) provides the highest internal rate of return (70% and 75% respectively, compared to rates of 20% to 30% for investments in irrigation, infrastructure and credit). It is pointed out, however, that the time it takes for investments in R&E to pay off are very long (9 years under this policy scenario).

²⁴ Note that such a model would in fact actualize the intent and the spirit behind the creation of the GTDR.

²⁵ Food aid may be used as a means to construct social infrastructure that reduces regional isolation, through the construction of roads in focused areas using Food for Work (FFW) programs. Care must however be used when promoting FFW as it may displace agricultural labor and push up agricultural labor costs while simultaneously reducing farm gate prices. The provision of FFW must therefore be scheduled carefully so it is sensitive to seasonal fluctuations in labor demand and product availability; and should not be used where other means are available—for instance, where the private sector might favorably consider investing to improve market penetration.

²⁶ In Honduras, the main force behind rural road building is the Association of Coffee Producers, which works in tandem with the State to link markets and provide outlets to producers in remote regions.

Such studies are extremely useful to policy makers who need to decide upon the allocation of scarce resources. The tradition initiated by studies such as the IFPRI/FOFIFA and the Cornell/IMATEP studies should be continued and further developed, providing Malagasy policy makers with clear options for improving food availability.

CHAPTER 4: FOOD ACCESS IN MADAGASCAR

Eighty five percent of the poor in Madagascar live in rural areas (Dissou et al, 2000). Any effort to reduce poverty and food insecurity must concern itself with the means of subsistence of rural people—particularly agriculture, which employs 75% of all Malagasy.²⁷

According to Figure 1, Food Access is influenced (i) by households' own production, (ii) by household market purchases, and (iii) by the transfers and loans the household receive.

- (i) Household agricultural production is affected first by its production technology, itself determined by factors such as agricultural research and extension, and by the farmers' skills and education. Second, household agricultural productivity is affected by the household's access to factors of production: land (quantity and quality—e.g. irrigated vs upland), labor (family and hired labor) and capital (credit, savings and domestic assets). Third, agricultural production depends on natural resource protection and on the proper management of natural capital, essential to ensure the sustainability of production and the capacity of farming households' to continue producing their own food in the future.
- (ii) Market purchases are determined by food prices and household cash incomes. Food prices are determined by supply and demand—an issue we examined in the previous chapter. Cash incomes are a function of wage work and other income generating activities (e.g. crop sales, handicrafts, small enterprises, etc).
- (iii) Transfer/loans are determined by social networks, remittances from relatives and by institutional transfers, in the form of food aid, government cash transfers, etc.

Agricultural Production

Agriculture currently generates 34% of the GNP, and produces 40% of export revenues. At the macro economic level, the agricultural sector is viewed as very competitive. Low labor costs, and favorable growth prospects combine in giving Madagascar's agriculture a good comparative advantage on the international scene. Rice, manioc, peppercorn, vanilla and coffee for instance, are highly competitive globally. Sugar and cotton are competitive at the farm gate, although not in international markets due to handling and transportation costs. This suggests that Malagasy farmers could fare better in producing their food and income, even become prosperous. For that to happen, however, the obstacles to growth will have to be identified and removed.

Production of the Main Staples

This sub-section highlights the situation with respect to the rice, manioc, livestock and fisheries sectors.²⁸ In all crops, the uptake of improved agricultural technologies by local farmers has been disappointing (Roubaud, 1998). Farmers are impeded from adopting improved

²⁷ This does not mean ignoring the urban poor—we spend a section on this issue further on—but it means recognizing that the bulk of poverty is in the rural sector.

²⁸ Maize and sweet potato are also important in the diet, particularly for the poor. We found no studies covering those crops, however. One recommendation is thus to examine, as it was done for manioc, the role and potential of the maize and sweet potato sectors, particularly with respect to food availability and access. Sweet potato is particularly interesting given its high nutritional value.

technologies by poor access to factors of production (land, labor, capital and knowledge) and because of bottlenecks in both the supply and in the demand side, mainly because of poor infrastructure (see Food Availability section). Soaring input prices also restricts the adoption of improved technologies, as suggested by the abrupt decline in fertilizer use since the devaluation of the Malagasy Franc in the mid-1990s and the introduction of a value-added tax. Besides, the low adoption of improved technologies may be that the technologies themselves (HYV seeds, in particular) are not yet well adapted to the country's conditions (Randrianarisoa et al, 1998. This is discussed in more detail under the "Seeds" sub-section). And last, as pointed out by several informants, the risks that face Malagasy agriculture (cyclones, locusts) discourage many from investing.

Rice Sector

Rice yields currently stand at 2 tons per hectare on average. Much higher levels could be obtained –trials in experimental stations yield up to 9 tons/hectare—but performance at the farm level remain low. The technology of production, both in upland rice and irrigated rice, remains largely traditional. Due to the low level of technification, production increases in both cases are due more to an extension of agricultural areas than to an improvement in yields. The consequences of this pattern of extensification put smaller farms at a disadvantage, given their limited access to land. Besides, extensification has well known impacts on the environment—decreased soil cover, nutrient losses through leaching and top soil erosion, siltation of downstream rivers, etc. Technologies that foster sustainable and profitable rice production are urgently needed.

A good example of such a technology is the SRI (Système Rizicole Intensif, or its variant, SRA—Système Rizicole Amélioré), developed for irrigated rice. This technology can sustainably multiply production but its success depends upon key conditions: (i) the availability of improved, well adapted seed varieties; (ii) the capacity to control water; (iii) the timely use of correct practices for transplanting, spacing and weeding; and (iv) fertilization (organic or chemical). Several constraints can affect the performance of the model. First, extension and a careful follow up of farmers are critical at the initial stages of adoption to ensure that the recommended practices are correctly and timely applied. A second constraint is that labor requirements are higher than under the traditional planting system. The success of the strategy thus depends upon the capacity of households to mobilize labor at key junctures, whether from their own workforce or through the labor market, which requires access to capital or credit. A third constraint is the availability of physical inputs (particularly fertilizers): it need not be costly (manure can be used; composts can be made locally), but preparing manure entails further labor. Finally, the heterogeneity of agro-ecological conditions in Madagascar calls for a careful adaptation of the model—the specific technological package that works well in one zone may not work in another—so micro-research is mandated, which increases the cost of using this model. In short, the successful adoption of SRI/SRA is premised upon the existence of basic research to develop the HYV seeds, of adaptive research to tailor the package to local growing and market (labor and credit) conditions, of making the seeds available to farmers, and of careful extension.²⁹

²⁹ This is critical: the USAID-funded IRRI/FOFIFA project has developed HYV seeds that are well adapted to a range of conditions in the country but the level of efforts going into extension have not been sufficient and it has not yet been possible to scale up the SRI/SRA approach, notwithstanding its great potential.

Manioc Sector

Manioc yields are 7 tons/ha on average. In the most productive regions, yields of 10tons/ha can be obtained. Manioc is grown all over the island, but is best adapted where soils are deep, light, rich in organic matter and on flat terrain. The cycle of production lasts one year, but this crop can be left un-harvested for longer periods, thus constituting an important buffer reserve for hard times. There are several local varieties—Beambony, Fitoravy, Kelimanatody, Makamena, Menalaingo, etc.—which are used in distinct regions in accordance with the particular agro ecology and with final use—for instance some varieties have higher cyanide content, which is preferred for industrial applications.

As for rice, manioc cultivation methods are mostly traditional and farmers rarely use external inputs, except in some specific regions (e.g. Tsiroanomandidy) where, following extension efforts, farmers have begun to use improved technologies such as manure application, plant spacing and annual fallows. Such experiences demonstrate that there is good potential for improved production.

Increasing productivity would be good for a number of reasons. First advantage is to improve food access for the poor.³⁰ For consumers, manioc prices are a fraction of rice prices, costing only 0.3FMG per calorie against 0.6FMG for rice (1999 prices) thus providing the same amount of calorie for half the cost (Dostie et al, 1999).³¹ As a result, the elasticity of manioc to income variations is lower than for rice, and its consumption remains high in times of duress (disasters or the hungry season), whereas consumption of rice declines considerably. There is in fact evidence of cross-price elasticities in some regions between manioc and rice, as poor households switch to manioc to offset rice price increases. Given current consumption patterns, future interventions focusing on cassava will clearly benefit Madagascar's most vulnerable populations.

Also, manioc is important for poor, isolated producers. Manioc production is more likely where land prices and land quality are lower, and in more isolated regions. Where land is more costly and valuable, households use more capital and labor intensive crops and thus grow less manioc. Also, as households are located further from the road, the importance of manioc increases. Every hour further away from the road increases the manioc share in upland area by almost 6% (Minten et al, 1998, Part 4:111). Besides, manioc constitutes a key dietary reserve for those periods of the year when declining household stocks and climbing rice prices move rice out of the reach of the poorest households.

The second advantage of increasing the productivity of manioc is that this crop has good potential to increase producer cash income. There are many uses for manioc besides human consumption—as animal feed, as starches for industrial applications, or as an export crop.³²

³⁰ In urban areas, consumption of this crop among the poor is double that found among non-poor; while in rural areas, the poor consume a third more than the non-poor.

³¹ Although nutritionists are quick to point out that the nutritional value of manioc is very low. It provides carbohydrates, but this is about it.

³² However, there are problems with each of those options that need to be addressed before a strategy is supported. As animal feed, manioc pellets in Madagascar are mainly used in the hog industry. Demand has been considerably reduced by the “peste porcine” which reduced herds by a third in one year. With respect to industrial uses, demand has also fluctuated with the recent closing of some key buyers, such as the SOTEMA “filature”. There were also issues with the quality of the product delivered to the industry by local suppliers. As for exports, the window of opportunity is progressively being narrowed down, due to high transport costs and poor port capacities.

However, and in spite of the importance and many advantages of this crop in Madagascar, manioc markets and their functioning remain poorly understood and unappreciated in this country. Similarly, there is a paucity of research on manioc production, with the exception of PAPAT (Projet d'Appui aux Plantes a Tubercules) supported by CARE, and PSO (Projet du Sud Ouest). The contribution of manioc to food access could be enhanced further by continued expansion of improved on-farm production technologies, manioc drying facilities and improved transport in key production centers.

Livestock

Livestock is a significant part of the livelihood and of the farming system in Madagascar, particularly in the Toliara and Mahajanga where cattle, goats and sheep are most numerous (see Table 4a). Livestock provides income to 60% of households in the country and contributes 15% of the GNP. It is a key element of food security in the South where it may in places replace entirely other forms of agricultural income. Its importance is more as an essential form of savings than as food, however: in fact, even in the South meat consumption is infrequent, being reserved for special occasions and social obligations. Thus meat contributes very little to the Malagasy diet, providing only 47 kcal of the average 2,300 kcal/person consumed daily in the country. Likewise, milk and milk products are little consumed overall, representing only 8,5 grams/day/person.³³

Table 4a: Livestock by Province, 1999

	Country	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
Cattle	7,316,507	820,639	666,651	836,860	2,359,701	415,070	2,217,586
Hogs	659,558	89,279	259,910	181,801	54,370	61,167	13,031
Sheep	523,902	10,151	3,400	18,918	2,641	2,186	486,606
Goats	995,540	326	43,550	1,037	104,059	131	846,437
Poultry	22,821,298	3,630,500	1,953,120	4,258,198	2,570,740	7,026,300	3,382,440

Source: MINAGRI, 2001

Most cattle belong to small holders. Except in Toliara, where herd size may range from 30 to 80 heads of cattle, most herders own fewer than five animals. There is an abundance of land for grazing and fodder production in Mahajanga and Toliara, which gives a comparative advantage to those regions for cattle raising, while providing a means to increase rural incomes. Intensive milk production, for instance, has grown rapidly over recent years and there is still much untapped potential. In general, however, production methods in the livestock sector are traditional and show low productivity. This may be changing in the broiler and hog industries catering to urban demand, but those sub-sectors are highly segmented, and have had little impact on the rest of the livestock sector so far.

³³ Only Toliara stands out slightly in milk consumption, with 21.6g/day/person (SEECALINE, 1996). This is not so surprising given the importance of livestock in that province. Note, however, that Mahajanga (the most important livestock province) consumes less than the national average. The consumption of milk and its by-products does not seem to be in the habits of rural people. Only in urban areas is there some demand.

The MINEL (Ministere de l'Elevage) used to provide extension and maintain veterinary services at the district level. The policy to move the State out of production and to concentrate on its regulatory functions has created a void. Private initiatives have emerged in the livestock sector to organize and consolidate small and middle producers into professional associations. The Maison du Petit Eleveur (MPE) has been officially designated by MINEL to propel the private sector's efforts in this area. The MPE has mainly concentrated its action on filling the technical and organizational deficits that were created by the withdrawal of the State. Efforts to organize producers are particularly critical as unorganized operators may not be able to confront alone the various challenges they face with respect to animal health, quality control, product marketing, fiscal and administrative regulations and so on. This is certainly a positive step, and the MPE has received strong support from some international donors, notably the Cooperation Francaise. It appears, however, that the MPE has been mainly interested in the dynamic, fully commercialized segment of the sector that caters to urban and peri-urban demand (broiler and hog industries, for instance). The small livestock owners of the rural hinterland see few services coming their way. This imbalance needs to be corrected. Livestock is more than a commercial venture for rural herders: it is the basis of their food and livelihood security. Their problems and their needs are different, and so is their margin for maneuvering.

Fisheries and Halieutic Resources

The geography and location of Madagascar offers considerable halieutic potential. Yet this potential has remained, until very recently, largely unexploited. This may be changing, however: in 1999, the industry generated 13% of the value of foreign exports, up from 10% in 1995 (MINEL, 1999).

Fishing is important at two levels: 1) the production of food for direct consumption; and 2) the generation of income for producers. As a source of food, fish and seafood are relatively unimportant, currently representing 7.4kg per person per year.³⁴ Furthermore, consumption among the poor is geographically localized along the coasts. There is potential, however, to increase the intake of high quality fish calory and proteins for rural populations by expanding aquaculture in inundated rice paddies.³⁵ LDI has experimented with such programs, which recel much—as yet untapped—potential.

As a source of income, fishing is likewise important only along the coast. Currently it employs about 5% of the total population, and represents 4.8% of GNP. Significant processes have been taking place in the fishing industry over the last few years. As shown in Table 4b, traditional (un-motorized pirogues) and artisanal (motorized pirogues) fisheries are thought to be on the decline, whereas industrial fishing and aquaculture (both marine and fresh water) appear to be on the increase. The shrimp sector, particularly, is expanding rapidly. These sub-sectors are mainly oriented towards export, thus their impact on food security is mainly through employment creation in the areas of exploitation.

The problems that hinder growth in that sector are similar to those that constrain growth in the agriculture and livestock sectors, namely the difficult means of communications and

³⁴ This is compared to 9.5kgs in developing countries as a whole, and 8.1kgs in African countries

³⁵ For instance frogs, eels and crayfish are traditionally eaten in some areas. Well targeted research and extension could increase the consumption of such proteins among populations that eat few animal products.

transportation, the lack of technical knowledge, the lack of access to credit and inputs, and the poor development of market outlets. To those, one must add concerns that are specific to the sector, particularly over-exploitation of some species, poor understanding of sustainable exploitation levels, high post-harvest losses due to lack of electrical power in remote regions, invasion by aquatic plants in continental fishing.³⁶

Table 4b: Halieutic Production in Madagascar, 1995-1998 (in tons)

	1995	1996	1997	1998
Industrial fishing	20,877	20,286	21,842	24,448
Artesanal fishing	686	557	809	623
Traditional fishing	63,864	62,977	63,190	59,833
Marine aquaculture	1,535	2,425	2,477	4,884
Fresh water aquaculture	31,177	32,650	32,650	32,011
TOTAL	120,139	118,877	120,968	121,799

The Government of Madagascar has proposed a series of action, in the context of the PADR and the poverty reduction strategy, to stimulate this sector. Studies will be conducted to assess extractive potential and to rationalize exploitation. Improved regulations will be enacted to control foreign catches, modernize the royalty perception system, establish protected areas and maximize linkages with the island's economy. Also, foreign donors will be encouraged to invest in basic infrastructures (ports, collection points with ice making facilities, roads and covered markets). It is expected that production and employment levels as a whole will triple between 1999 and 2015. Some areas are likely to benefit more than others—Antsiranana and Toliara, in particular, should see their port and industrial processing facilities increase; while the west coast stands to benefit most from the development of the shrimp industry (MPRH, 1999).

Access to the Factors of Production

Land

Land access and land tenure are relevant to food security in several regards: first, land ownership is an important determinant of income. Second, tenure security affects capital investments in land,³⁷ which is key to increasing productivity and income. Investments in sustainable practices, in particular, may not proceed unless farmers's tenure is secure.

Access to land. According to a recent study, access to land is the most important determinant of income in Madagascar (Dorosh et al, 1998). Poorer farmers have less land than wealthier

³⁶ Forty percent of Lake Alaotra and Lake Itasy, which could support productive inland fisheries, are now unusable because of this problem (MPRH, 1999)

³⁷ This issue is open to debate: is tenure more important to investment than the farmer's perception of risk? The economic literature relates this issue to the time horizon of the investment made. Investments that materialize in a short time frame—say within a growing season, such as High Yielding Variety seeds—do not require much tenure security, and may essentially be a function of perceived risk by farmers, or else, a function of the availability of inputs. If deemed profitable and inputs are available, even sharecroppers may adopt them, as happened in India's Green Revolution. On the other hand, investments that require long time horizons to materialize—say, tree farms, terracing, and other such measures—require tenure security (Hazell and Wood, 1999).

farmers. More importantly, they have less access to the best land.³⁸ The poor tend to own their plots in marginal, sometimes fragile areas, while the wealthy own more of the irrigated land in valley bottoms. Recent data actually suggests that this situation is worsening as access to irrigated land gets increasingly concentrated in the hands of a minority of wealthy farmers.³⁹ Meanwhile the majority of households operate ever more of their fields outside valley bottoms, often on fragile hillsides using technologies that, although they require less labor and capital, also generate lower returns and may negatively impact on the environment. Considering the limited land base of most farmers, such trends suggest that agricultural intensification will be crucial if we are to improve food security and protect the environment at the same time. There is an urgent need for research and extension in sustainable, intensive cultivation technologies for those farmers.

Land tenure security and investment. The land access problem is made more complex by the intricacy of land tenure regulations. The law currently recognizes many forms of tenure (formal ownership, lease, de facto occupancy, and several intermediary forms although the latter are not guaranteed by public institutions⁴⁰). The problem is thought to be greatest in zones of rainfed agriculture, where the relation to land is more complex and tenure security more problematic. In the irrigated perimeters, the tenure system—although often informal—is more transparent. A last point on land tenure is that inheritance customs may contribute to gender inequity as women can apparently not inherit land under the traditional system. This often forces female heads of households to enter into sharecropping arrangements in order to survive (WFP, 2000).

Currently, less than 10% of all agricultural land is formally titled, mainly in the large irrigated perimeters. The national cadaster is in its infancy, and the process of emitting a land title may take up to seven years (IMATEP, 1998). As a result, most areas exploited by local communities are still under state ownership. It is not clear whether such lack of formal titling creates tenure insecurity:⁴¹ farmers may actually feel that their tenure is secure under traditional land allocation rules, and as such may be willing to sink capital in long term land improvements. However, because credit institutions generally require a land title as collateral, the lack of titles may end up hindering investment where access to investment capital is the constraint.

Among actions currently under way to address the situation, the GoM has recently devolved some of the technical responsibilities in the titling process to local institutions (NGOs, private consultancy firms) and progress has been made in this area recently. The USAID-funded Landscape Development Initiative (LDI) project also supported communal titling in some of its areas, with apparent success.

³⁸ Dorosh et al, 1998, found a threefold average difference between the lowest and highest income quintile.

³⁹ In 1984, the poorest half of households held 20% of irrigated land. Today, 50% of households hold 2% of irrigated lands, whereas 10 percent of households own two thirds of the irrigated plots (DRSP, 2000).

⁴⁰ The EPM lists 5% of the population as practicing sharecropping. The real figures are thought to be much higher, however: this is an issue that people may prefer to hide, first because it is forbidden by law, and second because it may be tied to particular ethnic groups (former slaves). This makes it a sensitive issue.

⁴¹ We found no recent studies of land tenure in Madagascar. The only two references are Rarijaona, René, 1967: *Concept de propriété en droit foncier de Madagascar, étude de sociologie juridique*. Paris, Éditions Cujas; and Victor Gasse, 1959, *Régime foncier à Madagascar et en Afrique*. Paris : Librairie autonome. Likewise, we found no rigorous studies on whether or not formal titling is an impediment to investment in Madagascar. The international literature however suggests this may not be so. Only when investments are long term are require that farmers sink capital will tenure security be an issue (see footnote 37).

Access to Capital and Rural Credit

The World Bank views the lack of credit as a key reason for the low adoption of high yielding varieties and for the large inter-seasonal price fluctuations in grain (Haan et al, 2000). Likewise the IFPRI/ FOFIFA study reports that lack of access to credit hampers the use of inputs, and has negative impacts on productivity and on the capacity to store grain (Goletti and Rich, 1999). Conversely a study made in the highlands reports that access to credit has allowed important yield increases and reduced the pressure to open up new lands (Haan et al, 2000). Another result reported by Minten et al (1998) shows that credit increases production, either through productivity increases or through extension of cultivation in the lowlands (Minten et al, 1998). One interesting point noted by Lapenu and Zeller (1998) is that formal credit—when available—tends to be used for productive purposes whereas informal credit tends to be used for consumption purposes.⁴² The practical implication is that formal credit does more to increase net income than informal credit: in terms of elasticity, the authors show that a 1% relaxation of formal credit constraints translates into a .21% progress in income; whereas a similar relaxation in the informal credit sector translates into a .009% income increase.

However, less than 10% of interviewed farmers have access to formal credit (according to a survey conducted by USAID/INSTAT), generally from formal institutions that offered credit only to members of credit and savings associations or of village banks.⁴³ Women had even less access, with only 5% of them receiving credit compared to 13% for men. Constraints are particularly acute during the planting season, which corresponds to the hungry season and when prices are up to 50% higher than after harvests. Women-headed households, more likely to hire labor, seem here again to suffer more than men.

Where credit is available, formal institutions' interest rates (after discounting inflation) are between 15 and 25%. These relatively high rates supposedly reflect the riskiness of investment (although Malagasy farmers have repayment rates of 95% to 97%). Risk is not the only limitation, however: the amount of loan capital available is small because of the rural areas' reduced capacity for saving. Also, legal requirements force credit associations to deposit half of their savings in commercial banks as guarantee. Finally, farmers may themselves not be so keen on borrowing when the conditionalities are too stringent. Loans that are only available for mono-cropping schemes may be less attractive, especially if they are not accompanied by some form of crop insurance or risk management option. There is little information on such models in Madagascar. The international literature in this respect is reviewed in the final section of this chapter.

Solving the credit question will require working at multiple levels simultaneously. The titling of land should continue, as it holds the key to the private investments needed to increase food production and to protect natural resources.⁴⁴ In the shorter run, however, and for the purpose of small farmers' needs, it may prove more expeditious and less expensive to work at the regulatory level to make financial institutions more responsive to the needs and constraints of small holders.

⁴² This may be an artifact of the type of financial products available—e.g. if only production credit is offered to farmers, it is not surprising that all of the formal credit ends up fostering agricultural production.

⁴³ Demand exists: notwithstanding the high interest rates, 30% of households use informal credit. But the unit size of those loans remains small, not exceeding 2000FMG (US\$3) per person (Haan et al, 2000)

⁴⁴ As mentioned earlier, this is particularly true for long term investments typical of NRM programs. It may be less important for investing in technologies that yield benefits in the short term.

USAID already supports work along those lines.⁴⁵ On a parallel axis, lending institutions must explore traditional forms of collective responsibility such as community or group-based savings and loans schemes to reduce the need for collateral and improve access poor farmer's access to micro-credit, while reducing the risks of default that may arise from a bad agricultural year. Gender issues also have to be included.

Access to Production Inputs

Seeds. Up until 1994 genetic materials was essentially controlled and produced by State-sponsored facilities called “Centres de Multiplication Semencieres” (CMS). Each CMS specialized on a particular crop—Anosiboribory near Lake Alaotra in rice, Laniera near Antananarivo on vegetable crops, and so on. Donor-funded projects also worked on other crops (peanut, wheat, etc), developing first, and then contracting with seed producer organizations (Groupe Paysans Semenciers, or GPS). CMSs also used this mechanism whenever they ran into production constraints. Research into new varieties was done by the national agricultural research stations, FOFIFA and FIFAMANOR.

The creation of the CMSs and GPS in the 1980s increased considerably the availability of seed materials. Yet there continued to be shortages. With the State withdrawing from the seed production business in 1994, this situation only worsened. The link between research and seed production also lost its momentum. It is only now that this sector is getting reorganized, often under the aegis of institutional associations (IRRI/FOFIFA for instance in rice, or CARE/PAPAT for tuber crops). Also, commercial foreign products are entering the picture (albeit with mixed results, at least in the small holder sector—see Randrianarisoa et al, 1998: footnote #3). Finally, private producers (including GPSs) operating outside the CMS channels are gaining importance, now representing 40% of all production, up from 17% in 1993 (Randrianarisoa et al, 1998). Once certification and quality control procedures are done, the seed enters the marketing and distribution channels, which are likewise getting streamlined.

A very important caveat to all this, however, is the destination of those seeds: they are by and large purchased and used by farms using modern technologies, which represent a very small proportion of all the agricultural enterprises in the country.⁴⁶ Most peasant producers still use traditional varieties, and fall outside the circuit described here. The economics of supply will have to overcome this resistance before there exists sufficient economies of scale to make the seed business viable. Also, it has been noted that adopting farmers often use the seeds incorrectly, for instance continuing the practice of broadcasting rather than transplanting the seedlings. The greater quantity of seeds used increases the cost. Finally, and perhaps most importantly, serious doubts have been expressed whether the improved seed currently available in the country are worth the money.⁴⁷ The implications of those considerations for our purpose

⁴⁵ A Harvard University team was commissioned by USAID in 2000 to explore ways to improve the regulatory framework in matters related to credit. This study was unfortunately not available to us at the time of this writing.

⁴⁶ The IFPRI/FOFIFA study shows that the percentage of farmers using improved varieties is roughly 9.5 percent, while the percentage of land cultivated with these varieties is even lower, at 6.2 percent. See Randrianarisoa, 1998b.

⁴⁷ It is worth quoting the IFPRI/FOFIFA study at length here: “Improved seed varieties in Madagascar have the dubious distinction of an enormous gap between experimental trials and farmer yields. These gaps suggest an inadequate communication between research and extension. For example, at the experimental station, where the improved variety is cultivated on an average size plot instead of a very small plot, the yield is 75 percent of the original one. When the cultivation is on a multi-plot environment and still on an experimental station, the yield is 50 percent of the original level in the experimental station. That

are important: first, it appears that more research needs to go into developing seed materials that truly meet farmers' expectations and return on their investment. Second, much extension will have to accompany the introduction of improved seeds, to convince farmers of their value and to teach them how to use them adequately. Third, assuming farmers do accept the improved varieties *en masse*, then production facilities will need to be multiplied rapidly in order to respond to the increased demand (at the same time, however, herein lies multiple possibilities for entrepreneurial private sector ventures).

There are, at the same time, promising directions in current seed research, which mostly focuses on rice. FOFIFA research under IRRI/USAID funding developed disease-tolerant varieties in the North West. Another FOFIFA project in Vakinankaratra, with funding from CIRAD/CFD, proposes varieties of rainfed rice resistant to low temperature and high altitude. The same consortium in Lake Alaotra developed a high yielding variety that is more tolerant to delays in transplanting than the usual variety (IFPRI/FOFIFA 1998b). All this results suggest that the potential payoff for investing in research that translates into increased productivity is high. This provides further support to Goletti and Rich's (1998) proposition that seed research should continue to be supported, as this is the intervention that has the highest internal rate of return of all those they considered.⁴⁸ This research should extend to manioc as well, and possibly to maize and sweet potato once the role of those in the Malagasy diet is better understood.

Fertilizers. The country imports on average 20,000 tons of fertilizers every year. Industrial crops, such as sugarcane and cotton, absorb half that amount. The rest is divided among other crops. Application levels in rice fields are very low—6 to 7 kg per hectare on average, in contrast with FAO's recommended two tons per hectare (Riandranarisoa et al, 1998c).

Regional distinctions are important, however: for instance, the IFPRI/FOFIFA studies document that more than 50 percent of farmers in the Vakinankaratra region use fertilizers, versus about 22 percent in the Fianarantsoa highlands, and virtually none in Mahajanga—even on irrigated rice perimeters. Studying the determinants of fertilizer use on all crops using a sample of farms from five regions in the country, Riandranarisoa and colleagues (1998c) report that most significant variables are climatic risk (cyclones and flood)(-)⁴⁹, disease risk (-), price of lowland (explained as a proxy for land scarcity) (+), total area on upland (explained as a proxy for cultivation of cash crops)(+), and education of household head (+). Other variables that, although still significant, exert less influence, include fertilizer price (-), producer prices for agricultural products (+), distance to the fertilizer distribution point (-) and local wages (-).⁵⁰

implies a difference of 6 tons/ha, derived from the potential yield of 8 tons/ha and the actual yield of 2 tons/ha. One might wonder whether such varieties could be call "improved" at all. If the gap of 2 tons between farmer yields and experimental stations (at the multi-plot level) is explained by agronomic practices that are not still fully understood by farmers, it might be that extension could help to disseminate the needed information. But given that seed farmers, who have greater access to credit, inputs, and extension advice, obtain yields that are only marginally higher than rice farmers, it suggests that the large variation in yields must be attributed, in part, to the technological gap in seed quality". Riandranarisoa et al, 1998b:67

⁴⁸ Goletti and Rich compared the costs and benefits of road infrastructure, credit programs and seed research combined with extension. The latter offered the highest return over the long run.

⁴⁹ All the relationships noted here are statistically significant. The plus and minus signs in parenthesis refer to the direction of the relationship. When positive, the use of fertilizer increases as the reference variable increases. When negative, the use of fertilizer decreases as the reference variable increases.

⁵⁰ It may appear surprising at first sight that input and output prices are less important than plant disease risk in determining fertilizer use, yet this may be explained quite simply as typical risk avoidance behavior. Farmers will accept to bear the costs of intensification if their perception of risk is low, but will avoid sinking capital when a substantial risk—for instance, the loss of an entire crop to pests—is present.

Markets

Input markets. As mentioned earlier, the use of modern inputs remains very limited, notwithstanding the reforms introduced to improve the efficiency of the distribution system. Following the reforms, the private sector increased its participation in input markets and as of now, the distribution of agricultural inputs is largely in the hands of private agents. Competition in this market is described as high, with low entry barriers. However, a series of factors hinder the capacity of intermediaries to expand, notably: limited demand for agricultural inputs, high cost of transportation and road insecurity, high credit costs, and high and unstable import prices (IFPRI, 1998, Part 2).

As we saw above, low demand for inputs is associated with their high cost, farmers' lack of access to credit, to agricultural extension, and to output markets and the generally poor production (especially irrigation) infrastructure. Very important also is the lack of well-adapted high yielding varieties in rice. As long as those conditions prevail, there is little chance of seeing intensive farming truly take hold in the Malagasy context, even though market operators and the regulatory structure are in place.

Output markets. Just as for input markets, private trading in agricultural outputs has increased markedly following liberalization. This has fostered the emergence of new distribution networks and market services, which now exist in many places where they used to be absent. Yet trade in produce—particularly inter-regional trade—remains small, with any individual trader dealing with low volumes and geographically reduced market coverage, rarely covering more than 25 to 50 kms radius.⁵¹ The high cost of transportation partly explains the low mobility of traders.⁵² Another constraint that negatively affects the development of markets and trade is credit. There are high transaction costs for traders who want to use formal credit—cost of time and transport to distant banks, tedious paperwork, lack of collateral, high interest charges, and so on (Mendoza and Riandranarisoa, 1998). Thus traders frequently use their own savings to finance their operations, which seriously limits their capacity to invest. Therefore, while the lack of formal credit has not stopped the development of private initiative, it has slowed it down considerably. Another constraint that affect inter-regional trade is corruption. There are numerous police checkpoints where policemen and local authorities impose an informal “tax” on shipments. Almost all traders interviewed in the IFPRI/FOFIFA study said they regularly suffer from this. Theft by roaming bands of outlaws is also mentioned: sometimes, a whole consignment gets stolen, along with the vehicle. Such risks reduce traders' willingness to carry large quantities over distances, particularly in remote areas.

Those problems often translate in lower prices being offered to producers, traders passing to farmers the additional costs incurred for doing business in remote areas. Prices, however, are not the only aspect that determine whether or not a farmer will sell his output. Badiane, for instance, reports that each additional hour distance from the main road reduces the level of marketed surplus by 13 percent. If, on the other hand, households have sufficient access to marketing services (as indicated by the ability to chose between traders) their commercial

⁵¹ There are significant differences between types and size of traders, however. Traders who process large quantities of commodities go farther and depend heavily on transportation than small traders, who operate mostly at the local level.

⁵² Transportation costs, which are estimated at \$0.23 per ton per km on average, can go as high as \$5.07 per ton per km when traveling over poor roads.

surplus increases by more than half compared to households that do not have that choice. The access to marketing services does not only raise the level of surplus produced, it also raises the probability of a household being a net seller. Those findings illustrate further the considerable importance of roads and market access for output growth, income generation and ultimately, food security.

Labor and Labor Migration

Most rural households sell labor at some point in the year, and the large majority (more than 90 percent) sell it to the agricultural sector, as there are few other rural employment opportunities available. Those who engage in non-agricultural activities and earn permanent wages are the lucky few and they tend to be wealthier and better educated. The rural workforce, in general, is unskilled, and young.

All people show high level of participation in the labor market no matter their age or socio-economic level. The only exception in this respect is with regards to children from wealthier households who tend to go to school more than the others: a third of the children from wealthier households are on the labor market, compared to half of children from poorer households. The contrast is even sharper in urban areas, where children from poorer households are twice as likely to be on the labor market compared to children from richer households, who go to school. This has obvious consequences on the future capacity of poorer families to improve their productivity and skills (Dorosh et al, 1998).

Labor migration is common everywhere, but is more important in the Highlands than in the lowlands. This is because most agricultural production expenditures in the highlands go towards input purchases (seeds, fertilizers), whereas in the lowlands, most productive expenditures go towards labor purchases. Surprisingly, labor mobility seems greater among wealthier households than among poorer ones. For instance, the proportion of households that have never lived elsewhere is much higher among the poorest quintile (79%) than among the wealthiest one (54%). When the poorest households migrate, it is more because of marriage and family reasons (76%) than to look for work (20%). These proportions are quite different among the wealthiest households where the two motives are equally important (family reasons: 44%; search for labor: 42%) (Dorosh et al, 1998).

There is considerable permanent migration as well. Those who move permanently mostly respond to land availability. As noted by Zeller et al (1998:282), rural to rural migration is largely driven by the possibility of further expanding the agricultural frontier; and villages with ample land have a net immigration rate that is five times higher than villages with finite land availability. This issue is examined again under Environment.

Human Capital Formation: Agricultural Extension and Education

As mentioned above, labor in Madagascar is largely unskilled, and is poorly educated. Overcoming the limitations of the sector will require investing in human capital. This sub-section examines the situation as it stands with respect to the two main mechanisms for skills and knowledge transfer: agricultural extension and formal education.

Agricultural extension. The Programme National De la Vulgarisation Agricole (PNVA) has been operating the largest agricultural extension program in Madagascar. Official figures for the 1999-2000 season claim a coverage of almost 1,900,000 farmers. However, as noted by Hirsch, the PNVA's definition of coverage is vague and does not imply that extension work is actually being carried out (Hirsch, 2000:18). The quality of the PNVA work has also been criticized. At least until 1998, extension was still planned at the central level with low farmer participation at the local level; services in remote areas were virtually nonexistent due to the lack of transport and material; and technologies demonstrated in the field were not adequately followed up by extension agents. Minten et al (1998) for instance, note that access to extension services has, by itself, no significant effect on yields after controlling for the independent effect of increased input expenditures. Because of those criticisms, the World Bank—which funded fifty percent of the PNVA program until September 2000—decided recently to withdraw its support. The PNVA now operates at 50% capacity only with GoM funding. The PNVA itself may eventually be phased out entirely as decentralization proceeds, since the need for, and format, of agricultural extension services will be defined by the GTDR in their regions, not by the GoM.

The same situation is affecting extension services in Livestock and Fisheries Ministries and in the Department of Crop Protection, all of whom are streamlining their extension services, intending instead to rely on private associations such as the MPE (see Livestock Section) for the provision and transfer of technical skills. Extension work in those areas cannot, however, be viewed in isolation of other concerns such as transport and refrigeration because of public health considerations due to the perishable nature of their products (milk, meat and fish) (Ministère de l'Elevage, 1999). As of this writing the future role of the State as regulatory and coordinating body in those areas, although conceptually defined by recent GoM documents such as the PADR, still needs to be put in place. The danger of creating a void is real.

International donors are however exploring new ways to provide extension. The CF/CIRAD⁵³ work in Toliara; GTZ's work in the Port Bergé District as well as in the Betsiboka and Bekily; Japan's work in Lac Alaotra and Antsirabe; and others, such as LDI, ADRA, CRS, the FAO, play an key role in this transition phase, pilot-testing approaches and assessing best practices. Approaches such as the "Farmer to farmer", or the "Model Farmer", are being tried with varying degrees of success by the likes of LDI, ADRA and Tany Meva. Scaling up those success stories still represents a formidable challenge, however. Also, the challenges that affected the performance of the PNVA are still largely the same: working in isolated, frontier areas is as difficult as ever (some areas, we were told, had not been visited by agricultural extension agents since 1974). In many localities there are no local NGOs, consulting agencies, or private enterprises to work with. Even when such organizations can be found, the fact remains that simply extending knowledge will not suffice. As was demonstrated by the IFPRI/FOFIFA studies, the existence of agricultural extension services in the village is, in and of itself, a positive but non significant factor for yield increases in rice (Randrianarisoa et al, 1998c). A package of services is needed besides extension, including credit for small farming implements, fertilizer, and seeds, before yield increases can be noted. And here again, isolation is bound to exert strong negative effects.

⁵³ See list of acronym at beginning of document for those.

Yet another source for the transfer of technical knowledge is the private sector. Many initiatives are already in place that provide training to farmers in their specialty niche —TIKO runs a 4,000 farmer milk outgrower scheme; LECO Fruit organizes small holder producers, providing them with credit and extension for the production of export-quality fresh vegetables; SOPAGRI, a small outgrower operation around Port Berger, SILAC, HASYMA, etc. are other important sources for the transfer of technical knowledge. We are not aware, unfortunately, of the criteria used for selecting farmers, thus it is not possible to say if the poor and the food insecure actually benefit from those opportunities; or what the impact of those schemes on farmers' income may be in the long run.

Education. Human capital is also created by formal education. Education is strongly linked with agricultural productivity and income; both of which contribute directly to increasing access to food.⁵⁴ That relationship has been firmly established in developing countries by the work of Thomas and Strauss (1995), and Glick (1999) for Madagascar.

According to the Glick et al (2000), 51 percent of school age children attend school in the country. There are no gender differences, the proportion of girls enrolling in school being exactly the same as boys across all income groups. There are notable differences in overall attendance between Faritany, however, with the highest number in Antananarivo (63%) and the lowest in Toliara (32%). There are also rural urban/differences, urban children being more likely to attend school (78%) than rural children (46%). Among the population older than 15 years of age, 89% of the population is literate in the faritany of Antananarivo, versus 47% in Toliara. Rural and urban differences again show clear contrasts, with 65% of the rural population being literate against 88% of the urban population.

The factor most clearly associated with primary education is household income: 33 percent of school age children attend school among the lowest quintile, compared to 72% in the highest quintile. The disparity between income groups is even greater when looking at secondary schooling. Such differences are mainly explained by the cost of education, which includes the direct costs (tuition fees, transportation, books and supplies) and indirect costs (opportunity cost of lost labor of the child to the family). Other factors that influence participation in school include the quality of schools, the distance of schools, and the education of parents (after controlling for income) (Glick et al, 2000). Deleigne and Miauton (2001) introduce an additional, spatial consideration: in urban areas, schooling is primarily determined by the households' economic capacity; whereas in rural areas, families weigh the costs and benefits of education before investing in it. For instance, coastal fishermen are not poor, but have little interest in educating their children, as economic opportunities from their trade are better than those education may offer. Said otherwise, the schooling system is unable to convince those parents of the usefulness of education. Those findings have clear programmatic implications. Resources aimed at public education should be directed where they are most needed, i.e. in rural areas and in the poorest regions; and should concentrate on improving quality.

⁵⁴ Education is also closely associated with other factors influencing food security. Girls' education is associated with lower fertility rates, since staying in school delays the age of marriage and of first pregnancies. Having smaller families increases overall food availability, both at the household and at the national level. Likewise, education contributes to a range of better nutrition and health practices, from health seeking behavior, to mothers' capacity to care for their children, including health and nutritional needs. These better practices contribute directly to improving the utilization of food.

In December 1997, the GoM adopted the PNAE-II (Programme National d'Amelioration de l'Education et de la Formation), for 1998-2003 period. Stated objectives were to promote universal primary education, to improve learning and the quality of teaching, to gradually strengthen the expansion and improvement of secondary education, and to modernize higher education. These efforts seem to have had a modest impact. The EPM 1999 show a slight reduction in illiteracy (49.7% in 1997, 48.7% in 1999). Improvements are also seen in educational progress as 39.7% of children completed their primary cycle in 1999, against 38.6% in 1997; and 18.8% completed their secondary education in 1999 compared to 10.7% in 1997. Educational opportunity is also improving, as enrollment increased from 66% in 1997 to 70.1% in 1999 (SPPM, 2000).

Other means are also available to improve the education sector. School feeding programs, and their more recent incarnation, Food for Education (FFE) programs, are frequently used to expand educational opportunity and improve educational progress and achievement among participating children (Del Rosso and Bergeron, 2001). For many years CRS has maintained a successful, country wide school feeding program in collaboration with its local partners,⁵⁵ funded by the P.L. 480 Title II program. ADRA has recently obtained USG resources (food aid) under President Clinton's Global Food for Education Initiative to operate a FFE program in schools in the Toamasina province. The SEECALINE project has also provided school rations to a large number of beneficiaries through a World Bank/World Food Program/UNDP collaboration. Initiatives such as those should be continued vigorously, as they represent a proven way of attracting children to school, and of keeping them there. However, food alone is not sufficient to ensure learning: it must be combined with other resources that improve the quality of teaching, and the quality of infrastructures.

Incomes

Food access is premised on the capacity of households to produce their own food and/or to purchase it on the market out of their income. Monetary incomes are very low in all areas. The 1999 EPM, which includes both monetary and non-monetary income in its calculation, offers the following breakdown by Faritany (rural and urban areas included).

Table 5: Household Incomes by Faritany (in FMG)

	Country	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
Total amt of income received (in billion FMG)	10,146,000	3,352	1,065	1,651	1,454	1,370	1,254
As a proportion of nat'l income (%)	100	27.9	8.6	18.7	13.7	15.5	15.6
Average annual income per household (in FMG)	3,354,910	4,176,799	4,084,537	3,192,784	3,834,209	3,005,037	2,802,942
Average annual income per person	693,946	820,725	848,162	603,982	725,603	604,762	548.242

Source: EPM, 2000

⁵⁵ Unfortunately, this program was phased out in 2000 and will likely not be continued in the immediate future.

The province of Antananarivo generates the greatest proportion of income in the country in absolute terms (27,9%), and Antsiranana generates the least (8,6%). When looking at income per household and/or per capita, however, Antsiranana, Antananarivo and Mahajanga (in that order) receive the highest incomes per person, while Toliara receives the lowest income per person. Fianarantsoa and Toamasina also rank very low, offering per capita incomes that are only slightly above those of Toliara.

The EPM 1997 found that the main determinants of household income (using spending per capita as proxy) in rural areas are, in order of importance, access to land (particularly irrigated land); access to adult labor (particularly male labor); education of household head; livestock ownership; transfers; and presence of public investments (mostly in the form of electric power and roads) (Dorosh et al, 1998). The same determinants (including livestock) are found to affect household income in urban areas, except that land and public investments do not play a significant role (the latter because everyone has equal access to it). Interestingly, the gender of the household head does not affect income, even though the assets available to female headed households are comparatively less than in male-headed households.⁵⁶

Rural Incomes

In rural areas, household monetary income is derived both from agricultural and non-agricultural sources. According to Dorosh et al (1998), the main source of rural income is agriculture, and its chief determinant is access to land: wealthier people have more and better land overall than poorer farmers. All farmers rely on other strategies in addition to agricultural production to ensure their livelihood, but the importance of non-agricultural sources is greater among wealthier farmers than among poorer farmers, who tend to rely more narrowly on agriculture. The composition of rural household income is illustrated in Table 6, broken down by quintile.

Table 6: Composition of Income by Quintile (Rural Households Only)

Quintile	Net total income p/cap (1000 FMG)	Proportion of Net Income by Source (%)					
		Agricultural Crops	Other Agriculture	Wage	Non-agricultural enterprise	Transfers	Total
1	70	61.7	4.6	14.9	7.2	11.6	100
2	128	59.9	4.5	16.7	8.2	10.7	100
3	169	62.1	3.5	16.6	6.2	11.6	100
4	255	57.8	3.8	18.2	7.5	12.6	100
5	543	52.8	2.7	19.1	9.3	15.9	100
Average	233	58.9	3.8	17.1	7.7	12.5	100

Source: Dorosh et al, 1998

⁵⁶ For instance, female headed households on average have three times less male labor power, 25% less land, and two to three times less livestock than male-headed households. This is explained at least in part by the greater level of transfers received by female headed households.

Income from Own Agricultural Production

Looking specifically at agricultural income, Minten et al. (1998) show that revenue levels are function of input use—the more inputs are used, the more the production, and the greater the income—although net returns, while remaining positive, are reduced by the cost of inputs. Rice is the crop that most contributes to cash income, but this is because rice by far dominates production in most farms' overall portfolios. In reality, however, the proportion of total rice produced that is sold is small compared to other crops that are grown exclusively or mostly for sale, such as coffee, fruits, vegetables, peanuts, beans, etc.

The distribution of agricultural monetary income by crop varies by Faritany, and within Faritany, between regions. Particularly, where land is more scarce (such as in the highlands), farming systems tend to be more labor- and capital-intensive and farmers are more inclined than elsewhere to cultivate intensive crops (e.g. vegetables and fruits) and to use modern inputs, as this augments their income per surface cultivated. Since they have less land, however, they still face problems bridging the agricultural income gap, which explains the labor outmigration from that region. The distribution of irrigated to upland fields also affects the farmers' portfolio: where irrigated lowlands predominate, the emphasis is on rice production for consumption purposes. Where land is more easily found in uplands, the cultivation of cash crops becomes more important. Livestock, although not very important on the aggregate as a source of monetary income, is important in some regions, particularly the South. These findings confirm that programs aiming at increasing agricultural incomes must pay close attention to the comparative advantages of each region and to the specific factor constraints faced by rural communities.

Agricultural producer prices. Malagasy farmers produce for internal consumption and for export markets. The evolution of prices for the period 1996-1999 is presented in Table 7 for most important marketed crops.⁵⁷ The nominal (non deflated) value of all crops has increased (except for black pepper and cotton) since 1996, sometimes by a factor of more than 7 (e.g. clove). However, the inter-year price variation is large, especially for crops that show high relative price increase over that period—said otherwise, those commodities appear to be affected by boom and bust cycles. Thus, although potentially lucrative, they also represent risky investments.⁵⁸ Other crops, such as staples, exhibit moderate variability from year to year.

⁵⁷ The Tables offered by MINAGRI's *Annuaire de Statistiques Agricoles* do unfortunately not present information on the income provided by vegetable and fruit crops, which are cultivated by small holders all over the country and constitute (unless they inhabit one of the export production areas) an important source of agricultural cash income.

⁵⁸ The coefficient of inter-annual variation column shows that crops with extreme variability (above .7) are clove and vanilla, both of which are destined to the international market. Crops with large variability (.5 to .7) include, in decreasing order, sweet potato, potato, green pepper, sugarcane, maize, and manioc (both fresh and dry), all of them (except pepper) staples destined to the national market. Crops with moderate variability (.3 to .5) include dry peanut, coffee, bean and rice which, except for coffee (88% of which is exported) are for national consumption and are superior goods. Crops with greatest stability (<.3) are cotton and cacao both of which are considered industrial crops with openings on both internal and external markets.

Table 7: Evolution in Producer Prices for Main Market Crops, 1996-1999 (in FMG)

	1996	1997	1998	1999	% Change (1999/1996)	Coefficient of inter-annual variation ⁵⁹
Paddy rice	760	858	1,070	1,100	44.7	0.42
Maize	360	689	540	620	72.2	0.51
Manioc (dry)	350	485	633	600	71.4	0.50
Manioc (fresh)	500	557	995	525	5.0	0.60
Sweet potato	283	875	1,171	890	214.5	0.68
Potato	500	300	325	740	48.0	0.66
Bean	2,160	2,875	3,167	3,360	55.6	0.43
Peanut	1,107	1,808	1,677	1,500	35.5	0.45
Sugarcane	284	700	750	800	181.7	0.61
Cotton	1,934	ND	2,075	1,784	-7.8	0.27
Pepper (green)	ND	2,500	3,033	5,000	100.0	0.61
Pepper (black)	25,000	1,8750	1,8750	20,000	-23.1	0.38
Clove	2,860	9,000	9,000	23,000	704.2	0.88
Coffee	4,125	5,000	6,500	5,500	33.5	0.43
Vanilla (green)	10,500	10,500	10,500	25,000	138.1	0.72
Cacao	5,500	5,500	5,500	6,000	9.1	0.21

Source: MINAGRI, 2001

The production of cash crops is characterized by marked regional differences, thus so is the distribution of income from each crop. Traditional spice exports such as vanilla, clove, pepper are grown mainly along the eastern coastline, in the Faritany of Fianarantsoa, Toamasina and Antsirana. Coffee and cacao are also found mainly in those provinces. Other crops are grown all over the country, but the proportion of the production that is sold varies considerably between Faritany.

As mentioned earlier, most households engage in the selling and buying of rice. The IFPRI/FOFIFA study found that 60 percent of surveyed households were net buyers, and 36 percent were net sellers. Such high level of commercialization means that the variability in prices will have a sizeable impact on household expenditures and incomes. One issue that needs to be emphasized is that poor rural households are often net rice buyers, therefore they can be hurt by

⁵⁹ This coefficient is computed as the inverse of the square root of the mean divided by its standard deviation, or $(1-(\sqrt{x}/\sigma))$. The cutoffs suggested in the previous footnote between extreme, large, moderate and small variation are arbitrary and serve only an illustrative purpose.

rice price increases. Richer rural households, on the other hand, who are surplus producers, are favored by higher rice prices (Minten et al, 1998, Part 4:108).⁶⁰

Seasonal price variability is also very pronounced. Rice, which used to be subsidized but is now traded freely, shows regular seasonal movements with highest prices in March (hungry season) and lowest prices in June (harvest season) (Minten and Mendoza, 1998). The difference can be very large: rice prices in rural areas are on average two to three times as high during the lean period as in the harvest period. On farm storage, which could smoothen those fluctuations, is practiced only for short period, usually not exceeding one month.⁶¹ Rather, farmers sell their production immediately after harvest, because of cash constraints.⁶² Since the poorest households are usually net buyers, they are seriously affected by this variation. Research has shown that the hard infrastructure (roads, mainly) and soft infrastructures (banks, extension, access to inputs) have beneficial effects on price levels and variability. Access to formal and informal credit sources reduces the seasonal spread significantly in those villages where rice is an important source of income (ibid).

Off-farm Income Earning Activities in Rural Areas

The majority (52.6%) of households in the IFPRI/FOFIFA study were involved in off-farm income earning activities. A negligible minority benefits from relatively well paid employment in the administration and/or rural industries. Most of the demand for labor is in the agricultural sector, and those who most purchase labor are land-rich farmers. Agricultural wage labor provides on average 11 percent of all income (Zeller 1993)—although this share can represent a dominant portion of the total income for landless households, who are generally among the poorest of the poor. Small trade, handicrafts, gathering activities (including hunting, fishing and gathering of firewood and forest products), are other important sources of income, providing revenues to nearly 25 percent of households. Women take an active role in all off-farm activities, although they earn on average 30% less than men for their work.

The relative importance of off-farm incomes differs significantly between regions, with a greater propensity to depend on wage in areas where land is scarce (e.g. Fianarantsoa Highlands); and less so where land is abundant (e.g. Mahajunga). Wage levels also differ importantly between regions, in an apparently inverse proportion to labor supply—that is, wages are highest where households least depend on wage labor (such as in Mahajunga), which probably reflects the scarcity of labor supply. Payment for agricultural labor is usually in kind, measured by quantities of rice. Using quantities of rice paid, Zeller et al (1998) show that wages have decreased over the last ten years in most of their study regions except for one, Vakinankaratra, where they have increased slightly.

An important determinant of agricultural wage rates is the productivity of agriculture. Just as higher input use and intensified agriculture leads to increased agricultural income, wage labor

⁶⁰ There are some indications however that this line of thinking may not be so straightforward: Barrett (1997) for instance provides evidence that net buyers of rice have increased their production as market prices for rice increased (quoted in Sect 4:281).

⁶¹ Minten et al (1998, part 3, Ch. 8) found that 3-4 percent only of households held to their rice for longer than three months.

⁶² Other reports attribute the lack of storage to the fear of theft by *dahalo*, and/or to a cultural rejection of social differentiation through accumulation.

also benefits from intensification, although not to the same extent as family labor which receives most of the gains from productivity increases. A second determinant noted by Zeller and colleagues (1998) is population density: villages with higher population density pay higher wage rates. This as explained by the authors, is a function of greater economic diversification leading to lower transaction costs. Also it appears that the presence of credit—because it fosters intensification—improves wage levels but the relationship, although strong, was not significant. Finally, rice prices are an important determinant of income, as a very large proportion of the wage is paid in kind. At that level, the greater the self-sufficiency of the village in rice production, the higher the wage (as a quantity of rice).

Self employment (gathering of firewood and forest products, hunting, fishing, handicraft, small trade and renting of land or equipment) is practiced by 42% of households, with trade and handicrafts being the main sources of revenues (Lapenu et al, 1998). Much variability exists in the importance of those sources in each family, attesting to the diversity of conditions and options available. Income diversification is particularly important for the poorest households, who earn on average 35.6% of their income from off-farm sources (agricultural wage labor being the most important source), compared to the wealthiest for whom that proportion is 23.9%. Programs that expand opportunities for post harvest transformation, micro-enterprises can be particularly important for poor non-farm owners, who typically are the poorest of the poor.

The analysis of the determinants of household off-farm income underscores the importance of the socio-economic environment of the household: access to credit, to infrastructure, to education, all influence positively the size of income. In addition, the stage in the household's life cycle,⁶³ the gender of the household head, and the value of household assets, are significant predictors of the importance of off-farm. Interestingly, the number of women in the household is also positively correlated with the share of income from micro enterprises, signaling a potential window of opportunity to raise female revenues through well targeted micro-enterprise development activities. As for all female-earned incomes, however, the revenue from those enterprises is very low.

Transfers and Loans

Transfers between households are an important means of self-help, thanks to which vulnerable households may, at times, overcome temporary constraints and access food. In Madagascar, this mechanism is widespread across all income groups, although the size of transfers varies substantially across groups. According to Dorosh and colleagues (1998), the greatest levels of transfers occur among the best-off households who received 44,000FMG per person versus 5,000FG per person among the poorest households.⁶⁴ At the same time, transfers are important to the poor, for whom they represent more than 10% of their total revenue. Also, urban female headed households (but not rural ones) benefit more from transfers than male headed ones.

It is difficult to trace exactly the source of transfers, but remittances made by the Malagasy diaspora abroad almost certainly contributes a major portion: in 1995, the country received 320

⁶³ The household life cycle refers to the various stages a family goes through, from early stage where only the parents provide for their young children, to a middle stage where children's labor is used as family labor, to late stage when children begin to leave the family to establish themselves elsewhere.

⁶⁴ Aggregate average at the national level was 15,000FMG/person/year

billion FMG in net private transfers from abroad (Central Bank data, cited in Dorosh et al, 1998:27). It is hypothesized that this is the reason why the wealthiest receive most transfers, as they are most likely to have relatives abroad.

Loans are also commonly used by households in dire straits. Those usually take place between relatives, or are obtained from traders or neighbors. Usury appears to be very common in such cases, even among close relatives. Dissou et al (2000) point here to the dynamics that preside over the transformation and adaptation of traditional forms of self-help: in rural areas, the communal systems are increasingly loose, under the pressure of land scarcity, outmigration, and the like. This forces self help mechanisms to evolve towards new forms, sometimes as credit and usury. In urban areas, those traditional mechanisms get dissolved almost completely, but can be replaced by new forms such as neighborhood associations. Dissou and colleagues further comment that, although the traditional safety net mechanisms may still function in limited situations, those mechanisms come apart when hardships—such as general economic stagnation, or natural disaster—are felt by the whole population (ibid).

Food Security in Urban Areas

Roughly twenty percent of the Malagasy population lives in urban areas, but this proportion is increasing. The population in the capital city, for instance, is growing faster (at 3.6 percent per annum) than that in the country as a whole (2.8 percent).

The main cities of Madagascar are, in order of importance, Antananarivo, Tamatave and Fianarantsoa. Those cities—particularly Antananarivo and Tamatave—confront very similar conditions: they are prime examples of the intermingling of urban and rural contexts, with extensive surfaces within the urban confines being kept under agricultural use. Antananarivo, for instance, is built on a series of hills overlooking a broad plain where rice is still cultivated. This pattern of urbanization creates problems such as overcrowding in elevated areas, lack of housing, and poor hygiene due to the almost permanent presence of water in irrigated rice fields. There are pockets of deep poverty in the city hills but the poorest segments of the population tend to live in the valley bottoms, which are particularly susceptible to rainy season flooding and overflow from garbage and sewage. Those poor hygienic conditions are an important risk factor for gastro-intestinal infections, including cholera. Food security interventions in Malagasy cities thus have to include water and sanitation issues in their efforts, in addition to actions meant at improving food access.

Food Access in Urban Settings

Because cities are market nodes, the question of food availability is rarely an issue in urban areas. Food is present. The food problem in urban contexts rather relates to access and utilization. In the section below, we discuss urban food access. Utilization is discussed in the next chapter.

As shown in the previous section, agricultural production is the dominant strategy for rural households to ensure their access to food. In urban areas, monetary incomes are more important. This is illustrated by Table 8, which shows the proportion of calories provided by the various sources of income to the household. The final amount of calories consumed are roughly the same, and the conceptual categories of own production, market purchases, transfers and loans

still apply in urban zones, but the mix is different. Thus, two key elements enter the picture with respect to food access in urban areas: food prices, and monetary incomes.

Table 8: Calorie Consumption Per Source of Food

Source	Urban	Rural	Total (average)
Own production	433	1424	1212
Purchases	1587	570	787
Transfers	51	85	78
Total	2071	2079	2077

Source: Dorosh et al., 1998

Urban Food Prices

Just as in rural areas, rice is the preferred food in urban areas, although manioc is very important as well. Prices of rice have increased by more than 100 percent following the removal of government subsidies in 1984, and they now show a seasonality—including in cities—that did not exist before.⁶⁵ Rice represents on average 30 percent of all expenditures for the urban poor, but its increasing cost and high price variability explains the large price elasticity of that commodity among that socioeconomic group (.55). Elasticities are much lower for manioc (.12) (Ravelosoa et al, 1999), suggesting it is as much a key commodity for the urban poor as it is for the rural poor.

Urban Monetary Incomes

In this section, we examine how the urban poor obtain their incomes. Table 9 shows the important differences that exist in average income per household and per person between urban and rural areas. Not surprisingly, the capital city is where individuals receive the highest income in the country. On average, a person living in Antananarivo earns more than twice the national income. People living in other large cities and/or in secondary cities, also have higher average income figures than rural people.

The EPM, unfortunately, does not disaggregate the data by income quintiles within urban areas. If this were available, one would most likely find that the poorest quintile in urban area fares scarcely better than the corresponding group in rural areas.⁶⁶

⁶⁵ This is basically a supply issue, not a demand one: the seasonality of production and harvests levels in producing areas is what explains best the variation in city prices, and thus on the capacity of the urban poor to access food (Minten and Mendoza, 1998). Other aspects that relate to seasonal production cycles are the increased costs of transports during the harvest season, because of the deterioration of roads; and the occasional disruption of supply lines due to cyclonic events (Minten, 1997).

⁶⁶ We are led to this conclusion because the prevalence of malnutrition and other indicators of well-being, are similar in urban and rural areas. It is true that average incomes are higher in urban areas, but this is an artefact of the skewed income distribution typically found in urban settings, where one finds the holders of capital—a tiny fraction of the population that claims a large share of the total income stream—and the urban middle class employed in the formal sector. The latter, albeit small in urban Madagascar, also elevates the urban average with its better and steadier wages. Those groups are not the ones we are most interested in here: our focus is the urban poor, who work in the interstice of the economy, largely in the informal sector, and whose conditions we believe are scarcely better than the rural poor.

Table 9: Household Incomes by Faritany (in FMG)

	Country	Capital city	Other large cities	Secondary cities	Rural areas
Total amount of income received (in billion FMG)	10,146,000	1,064	676	1,700	6,708
As a proportion of national income (%)	100	10.5	6.7	16.8	66.1
Average annual income/household	3,354,910	6,427,278	4,982,812	4,588,252	3,059,540
Average annual income/person	693,946	1,385,825	968,604	950,125	589,679

Source: EPM, 2000

The minimum wage (SMIG) also increased nominally over that period. Its purchasing power has fared differently with respect to each staple: rice prices have seen a large relative increase and while a minimum daily wage could buy 3,8kg of rice in 1982, it could buy only 2.4 kg in 1996. Not all food prices have increased, however. In 1996, for instance, bread was half its 1984 price (Minten, 1997). Also, when considered in terms of buying power, the prices of maize and manioc have gone down: in 1982, the SMIG could buy 2.1kg of maize and 4.4 kg of manioc. In 1996, those values were 3.9 for maize, and 5.1 for manioc (Dorosh et al, 1998: Table 41).

Unfortunately, we found no conclusive studies showing how the real income of the poor in the urban informal sector compares to the SMIG, nor of the informal sector itself—how people from the lower socioeconomic groups generate their revenue is still unknown to a large degree. A study of social mobility among the urban poor by IMATEP (1999) suggests that socioeconomic status in urban areas is dynamic. People move in and out of poverty more so than in rural areas. Also, the study shows that important determinants of urban wealth are education and the ratio of workers to dependent in the household unit. This suggests that, in urban areas as in rural ones, formal education and life skills acquisition represent essential intervention areas for long term economic improvement. Some USAID-funded programs (e.g the CARE/Mahavita project) address this issue by providing the means to train city dwellers in skills that have immediate social utility, such as cleaning and maintenance of the urban irrigation canals. In addition to improve water and sanitation conditions in local neighborhoods, programs of that kind have excellent potential for employment creation among the local inhabitants, thus enhancing their long term sustainability. Such programs should be continued and expanded, as they hold great promises to solve problems that have otherwise proven almost intractable.

Environment

Madagascar has a unique flora and fauna, making it a prime bio-diversity spot in the world. However, this invaluable asset is threatened by human activity. Colonization of primary forests,

the export of precious hardwoods, shifting cultivation, overgrazing, charcoal production, human made bush fires, and the pressure to create more farmland have combined to result in the massive destruction of forested areas during this century (Gezon, 1997; Jarosz, 1993). The exact nature of the problem differs across regions. In the eastern zone, where rainfed cultivation prevails, rice is cultivated on marginal lands using slash and burn techniques. In the central highlands, increases in demographic pressures are pushing people away from valley bottoms into the hillsides and remaining primary forests. In the western part, it is estimated that between one and three million hectares of savanna are burned each year for agricultural purposes. Wherever it happens, however, as the cycle of deforestation and erosion advances, rural communities and the country as a whole lose their key resources, are getting poorer, and see their food and livelihood security being degraded. No one can benefit in the long term from this situation. Solving the issue requires measures that address demographic, agricultural and poverty issues all at once.

Deforestation and Land Clearings

Overall, the country has already lost 80% of its forest cover, more than half of which has disappeared in the last 40 years. If current trends continue, forests will have disappeared by 2020. Farmers' growing occupation of primary forests is associated with the increased fragmentation of holdings in cultivated areas, with rapid population increases and an ever increasing need for food and fuel.⁶⁷ The farming system used by farmers in recently opened forestland is almost invariably extensive. This has serious consequences, both for the environment and for economic growth schemes. First, this "flight to the forest" does not stand much chances of improving incomes—it merely reproduces the system that sent the people to the forest in the first place. Second, the low productivity of this type of agriculture, and the rapid decline in soil fertility it entails, will keep pushing the expansion of cultivation into ever more new forestland.

Deforestation of primary forestland has other effects besides those. It increases erosion at a massive scale. Erosion depletes the fertility of soils in the hillsides; and soil loss from water runoff in hillsides threatens productive areas in the valleys with siltation, reducing production potential there as well. A World Bank study estimated that such environmental degradation causes the loss of 5% to 15% of the national GNP each year (Haan et al, 2000:10). Deforestation is thus accompanied by externalities that contribute to the stagnation of productivity in agriculture. To all those, one must add the invaluable damage caused to humanity and nature by the loss of biodiversity.

Secondary forests are also being cut down at a rapid rate. In the ten years between 1984 and 1994, non-irrigated land area expanded by 200%. Much of the new land has been put under slash and burn agriculture. For poor, labor scarce farming households, this is the quickest, easiest way to get around labor and capital constraints. Their expansion, however, comes at great environmental costs. Under the slash and burn system, production technologies are very simple and production can only be increased by extensifying, i.e. by bringing more land under cultivation. Under the reduced fallow period that characterizes the current system, the soil cover

⁶⁷ Interestingly, and contrary to general wisdom, it appears that poorest farmers are not the ones that invade forestland. A recent LDI study (Schoonmaker, 1999) shows that the greatest number of forest settlers come from better-off households, who have the means to spare labor and support financially the installation of a new homestead in remote regions. Laborers from poorer households seek alternative sources of income in agricultural day work or other income generating activities. The implications of this for targeting and policy action should not be neglected.

does not have the time to regenerate. Soils in Madagascar being highly erodible, the slash and burn system becomes a key factor in erosion, with all negative factors already described: decline in local fertility, sedimentation of rivers and rice fields downstream, etc.

Actions Undertaken in the Environmental Area

The GOM's Programme Environnemental (PEII) provides guidelines in directing investment towards environmental protection. The PEII promotes the active participation of poorer households, and actions that strive towards effectiveness and sustainability. To ensure the participation of the population, the PEII proposes improving tenure security, favoring labor intensive conservation projects, and financially supporting soil conservation activities. Poorer households should also be targeted in priority by extension services for the adoption of sustainable agricultural practices that contribute to watershed development and soil conservation (SPPM, 2000). Besides providing such guidance, however, the State can do little on its own given its limited resources. Considerable support in this area has come from international donors and organizations.

USAID has been an important player in this arena. Through the Landscape Development Initiative (LDI) program, USG resources have been used to promote the conservation of priority ecosystems while improving living conditions among local populations. Currently LDI is active in Fianarantsoa, Mahajanga, Toamasina (Moramanga), Antsiranana and Antananarivo. Other donors in the environmental area include the World Bank, the French Cooperation, UNDP and the GTZ, with additional contributions from the Dutch and Swiss governments. Programs in the field are implemented by a variety of players, including notably (on the international side) the World Wildlife Fund, Conservation International, CARE, ADRA, CRS, and PACT.

Within the broad context defined by PEII, actions in each region must be tailored to the environmental challenge at hand, offering approaches to reduce poverty while protecting the environment. The following axes for action are proposed:

Agricultural intensification. Land intensification can reduce pressure on marginal lands, as it promotes the concentration of factors in zones with higher agricultural potential. Resulting increases in productivity and better returns to labor lessen farmers' need to farm marginal areas. For families who lack access to prime land, landscape management—including terracing, agro forestry, etc.—may permit agricultural intensification. In either case, intensification involves the existence of a policy and economic environment favorable to investment, the availability of appropriate technologies, improved access to credit and agricultural extension.

Tenure security. Farmers who want to invest in their land, water, and forest resources need to have security of tenure. The State has a key role to play in this respect, as ultimate warden and guarantor of land titles. Currently, however, less than 10% of agricultural land is titled, mostly in the irrigated perimeters. The government has recently taken steps to speed up the process (e.g. by devolving some of the technical tasks to local institutions, producer associations, NGOs and private consultancy firms) yet the bulk of the work remains. Alternative approaches must be explored—titling is not the only road to tenure security. Local control mechanisms, for instance, have traditionally provided security and rules of usage to farmers. These have the benefit of being already in place, of being legitimate and of being well known to users. Working within the

confines of such traditional institutions may provide an interim approach to ensuring tenure security in the short run.⁶⁸ Besides, it is well in tune with the decentralization process.

Communal management of resources and community capacity building. Local communities are best placed to manage their natural resource base. Traditional local authorities still play a role in managing their local resources, but this role has been eroded over time by the concentration of decision power first under the colonial administration then under centralized State agencies, and by the rejection of the sometimes oppressive nature of local rule by disenfranchised groups. The LDI studies along the biodiversity corridor in Fianarantsoa suggest that this collapse of traditional regulations has led to a “grab all you can while it lasts” mentality, highly detrimental to the preservation of the remaining forests in the area. There is a serious dearth of studies on the subject, however. The decentralization process currently underway may favor a careful return to local management. In its Action Plan for Rural Development (PADR) the GoM has suggested the creation of regional working groups (GTDR-Groupes de Travail en Developpement Rural; see Rural Institutions Section) which may facilitate the reemergence of local authorities while ensuring that all groups—ethnic minorities, women, youth—are duly represented.

Strengthening communities’ capacity in managing their resources should go hand in hand with the community empowerment measures.⁶⁹ Access to environmental education, and to financial and technical assistance will be key to local capacity building and to the development of local conservation initiatives. Among measures offered, the GOM has proposed to grant a budget to each commune for reforestation, with premium incentives for most performing ones (SPPM, 2000). LDI has put in place an environmental refinancing fund (FIEFE, or Fonds d’Investissement pour les Entreprises Favorables a l’Environnement) that promotes lending at the best market rates from commercial banks and other financial institutions, to environmentally friendly enterprises. A trust fund has been proposed to fund initiatives that aim at generating income from jobs that protect the environment (USAID, 1998). There are, hence, multiple avenues one can follow to foster conservation while increasing incomes.

Microenterprise development. Promoting economic opportunities that are favorable to the environment will create incentives for a sustainable husbandry of the land. Initiatives in the area of ecotourism, the production of forest-based goods for the market, solar drying and other food transformation activities have all been successfully developed in Madagascar.⁷⁰ Their success usually depends on the availability of markets, technical assistance in setting up the scheme, and seed funding to initiate activities. Support measures for those schemes should be directed accordingly.

Energy conservation. Up to 95% of people in Madagascar depend on firewood or charcoal to cook their food, heat and light up their homes. People may spend up to 10% of their income on

⁶⁸ As an example, the LDI project has successfully supported rural communities in Mahajanga acquire the rights on their renewable resources.

⁶⁹ Many informants pointed to us that capacity is low, not only at the community level, but also at the level of NGOs, of the development agencies, of the regions, and of the State. For development projects to succeed, capacity must be built at all those levels.

⁷⁰ Leadership is provided in these areas by LDI, for instance, through its ecotourism development in the Montagne d’Ambre and Isalo regions; the habilitation of fish ponds in Fianarantsoa; and so on.

those sources of energy. Fuelwood is also utilized in small rural industries such as brick fabrication, lime oven, food stall owners, etc. Furthermore, it is estimated that the industry employs more than 100,000 jobs, constituting a full economic sector, complex yet largely informal. Specialized work niches—lumber jacks, coal makers, transporters—offer opportunities to professionals but also to the poor, to whom a tree may represent an essential complementary income, particularly when disaster strikes—sudden expenses, diseases or funerals in the family. It is estimated that fuelwood uptake for energy purposes represents between 25 and 50% of all the deforestation in the country (MARGE, 2000). In Madagascar, it is today equal to 10 to 15 million cubic meters per year, whereas natural wood production in the country represents between 35 and 40 million cubic meters. Thus, fuelwood collection in Madagascar is not benign: it is a direct cause of deforestation. This situation worsens as the market switches to charcoal. The production of charcoal represents grave environmental consequences as it doubles the uptake of wood per caloric unit produced. Yet it is increasingly becoming the preferred energy source in urban households: 90% of families use charcoal in Antananarivo, 80% in Mahajanga and Marovoy, and this energy source is becoming common in large villages. Adding to those considerations, firewood and charcoal use by Malagasy households represents the main source of greenhouse gases, well ahead of transport and industry. Finally, indoor air pollution related to the use of charcoal or firewood is believed to be a direct cause of respiratory infections, particularly among women and children.

There are solutions to the energy problem (switching to less polluting sources, such as gas, wind or solar power; improve the efficiency of stoves; improve the charcoal production process; plant energy wood lots; etc.) but none of those answers all questions, and they must all take into account the capacity of households to pay for them. The GoM recommends approaching the problem by combining energy saving with substitution and agro-forestry approaches. This is appropriate, but the “how” is important. A worldwide assessment made for the World Bank concludes that the most promising approaches include a devolution of forest management to local communities, coupled with the gradual shift away from woodfuel towards alternative sources (MARGE, 2000).

Future Directions in Food Access

This Chapter looked into issues that play a key role in determining access to food. In this concluding section, the main highlights are taken again and programmatic implications are briefly discussed and summarized.

Food Access in Rural Areas

In Madagascar, farmers’ own production plays a central role in ensuring rural household food access. Yet, the productivity of agriculture is very low, and few small holders have shown interest in adopting productivity-enhancing technologies. Farmers, it was found, may have had good reasons to do so: inputs are expensive and the “improved technologies” proposed so far offered only marginal benefits over traditional ones. Furthermore, the deficient infrastructure and poor market linkages reduce the incentives to produce a marketable surplus and to seek additional incomes via commercial production. Given those, the poor adoption rate of improved technologies is not surprising. Yet, it is clear that increasing food access depends upon the sustainable intensification of production. Development agencies thus should address the key constraints to the adoption of productivity-enhancing agricultural practices, namely the

technology itself, land, credit, infrastructure, and human capital. The risks that face Malagasy agriculture (cyclones, locusts) also must be considered, as they are a strong disincentive to investment. Disaster issues are covered in Chapter 6.

Agricultural Technologies and Extension

The IFPRI/FOFIFA economic studies demonstrated that research and extension are where returns to investment provide the highest payoff in the long run. Improved production technology has multiplier effects beyond simply production increases. Farm income, for instance, is associated with input use—the more inputs are used, the more the production, and the greater the income. Also, the productivity of agriculture is a key determinant of agricultural wage rates—the higher the productivity, the higher the returns to labor. Increasing the adoption of productivity-enhancing technologies thus benefits all the rural population, whether or not it owns the means of production. This is a clear case where both the poor and the non-poor stand to benefit. Improving agricultural productivity may also protect the environment if it results in concentrating labor in intensive production zones.

Under the current liberalization regime, however, the State is withdrawing from most of its research undertakings. This comes at a time when USAID is also ending its funding to IRRI and the World Bank is phasing out its support to agricultural extension services. Those moves are all well motivated—essentially, the resources invested were simply not generating the returns expected—but the void being created should not be left unattended as agricultural research and extension hold the key to increasing the output of Malagasy agriculture and to improving real incomes. Two steps should be considered to move out of this situation. First, commit to re-assign resources for research and extension. Given the diminishing role of the State in this area, it will be the task of donors, of the private sector and of civil society to ensure that the agricultural research agenda keeps moving forward. Second, examine again the modes of operation of agricultural research and extension services so they deliver better performance. USAID and its partners can play a meaningful role in defining the new operating parameters. Some elements might be considered as this re-engineering takes place:

- The country is agro-ecologically diverse. For smaller donors like USAID, supporting “niche” research and extension in their intervention areas and along well defined objectives is most indicated. Support to a national research agenda may eventually be provided by donors with larger resource endowments. Coordination between the local and national levels should be maintained via joint work committees, perhaps through the GTDR structure.
- The final technological package should be carefully tuned to local factor constraints. For instance, the data cited here shows that commercial inputs are more readily used in land-scarce regions. Thus where labor is abundant and land is scarce, R&D should target labor-intensive schemes such as vegetable cropping that create high value products from intensely managed plots. Conversely, where land is abundant but labor and capital are scarce, extension should focus on reducing destructive practices (e.g slash and burn) while providing alternative income generating schemes that create economic returns from preserving the forest—e.g. agro-forestry.
- Technologies proposed must respond to farmers expressed needs. This will increase their ownership of the research products, and maximize the sustainability of interventions.

Participatory research and extension of the “Farmer-to-Farmer” type may provide a useful model. LDI, Tany Meva, ADRA and CRS already have taken steps in that direction.

- Producer organizations, cooperatives and farmer associations provide a ready outlet through which extension services and general technical knowledge can be channeled to reach individual farmers. Working through such organizations also increases the legitimacy of the intervention, especially where local needs and priorities have been elicited through prior consultations.
- The private sector has access to extensive knowledge in specific commodity areas. Producer organizations may associate with specific agribusiness interests to palliate for the absence of the State or other actors in the provision of extension and other critical production inputs (credit, fertilizers, etc).

Agricultural research and extension shortcomings also confront the livestock and the fisheries sectors. The marketing of animal by-products, aquaculture in irrigated paddies and improved animal health present clear opportunities for improving incomes and for increasing the production and consumption of high quality proteins. This potential, however, will materialize only if simple, affordable technologies are developed. Where appropriate, the opportunities should be examined, analyzed and developed.

Land Access

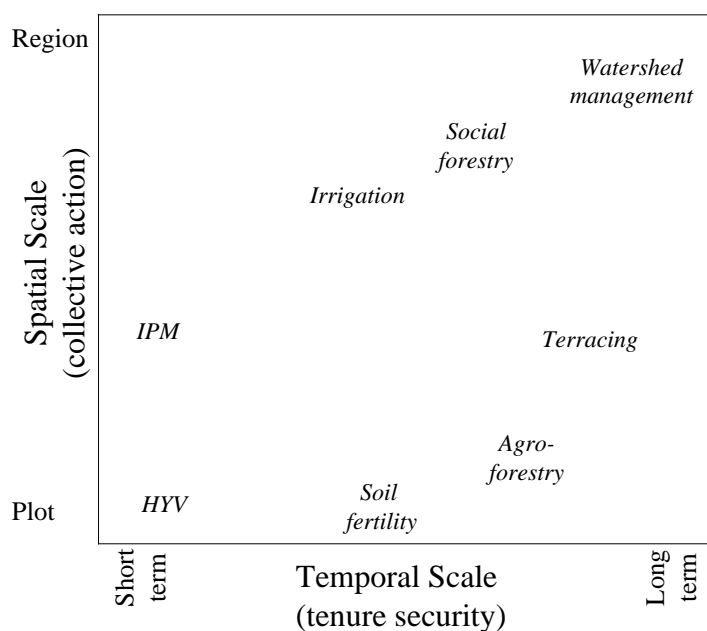
As we saw, access to land in Madagascar remains the most important determinant of rural incomes. Consolidating access to land should thus help increase incomes. By extension, it was also considered that increasing the security of tenure was a necessary step for agricultural intensification as it stabilizes farmers’ access and provides them with credit collateral. This position is still accepted by most scholars, but new research is making important nuances with regards to the type of investment that are affected by tenure security. In the past, tenure security was equated with ownership and title to land, as practiced in Western economies; and much of the policy prescriptions that have emerged for Africa in the immediate post-Independence years have suggested replacing communal land tenure institutions with freehold tenure backed by formal titles (see for instance Harrison, 1987; Feder et al, 1988). As is now understood, however, a title is not always necessary to secure one’s tenure.⁷¹ Definitions provided by Place et al (1994) argue that tenure security is function of four elements: excludability, duration, assurance and robustness, and that various indigenous property rights effectively include those elements. When this is the case, a title can do little to strengthen the tenure security of the user. This is not to say formal titles are always useless: where traditional systems have broken down, or where commercialization has advanced to the point where efficient credit and land markets are needed, then titling may be desirable, if not outright necessary (Knox et al, 1998; Bruce, 1993). But titling all the land is costly and lengthy, thus its desirability has to be reviewed carefully against local contexts and needs. We do not know of any review of this kind in Madagascar. It may be worth researching the issue, to better understand what is most needed at this point in time.

⁷¹ Land titling may in fact weaken tenure security in some cases, for instance when the effectiveness of indigenous property rights institutions supercedes national land laws in the eyes of local people; or when formal titles provide a pretext for well-placed elites to evict traditional holders (Knox et al, 1998).

Another area where clarification is needed in this area is who are the holder of property: an individual, the household, the community? In Africa where collective property is usual, this is particularly important as it defines who benefits from investment—and thus, who has an interest in doing this investment. To help in this regard, Knox et al (1998) propose a model that represents the adoption of specific technologies in terms of their spatial and temporal dimensions. Some technologies, for instance irrigation or integrated pest management (IPM) require substantial space to operate effectively and hence are facilitated by collective action. The temporal dimension also carry implications: in cases where technologies require long time horizons to generate returns on investment (for instance, agro forestry), tenure security needs to be addressed before the technology is effectively and widely adopted.

This is all represented in Figure 2, which places several technologies in their relative spatial/temporal scale. The figure is described by Knox et al, as follows: “HYV technologies, given their scale neutrality and seasonal nature, are placed at the lower end of the spatial and temporal spectrum. IPM requires a high degree of spatial coordination but has a short-run turnaround. By contrast, terracing technology may be very localized yet investment is continuous and long-term.... Watershed management, irrigation systems and social forestry require both longer time horizons and coordination among farmers. Finally, watershed management incorporates such vast spatial scale that it even extends beyond the realm of strictly local collective action as a feasible option due to the enormity of the transaction costs incurred. Here state intervention or co-management arrangements involving the state and local institutions may offer the best solution” (Knox et al, 1998:17).

Figure 2: Property rights, collective action and technology adoption



From Knox et al, 1998:18

If we accept the intuition behind this framework and apply it to Madagascar, then it appears first that insufficient attention has been given to the traditional tenure system, which was tossed aside during colonial times, but kept existing in parallel and is still known and recognized by farming communities (see for instance Freudenberger, 1999). USAID and its partners should carefully investigate traditional by-laws and indigenous property rights when proposing new technologies, asking how the traditional tenure systems and collective actions mechanisms already in place could be made to support agricultural investment and to protect the environment. USAID can also support the development of the regulatory process at the national level, particularly by making the formal and traditional system compatible. Finally, it is clear that a better understanding of the dynamics of the land market and of land investment patterns by private actors is needed. USAID could usefully sponsor studies along those lines in its intervention areas.

Micro-credit and Risk Insurance

Risk insurance, micro credit and safety nets were mentioned in the introduction, along with education and health, as key enabling mechanisms to improve the situation of poor. Action in those areas can provide them with the assets they need to move out of poverty. We dedicate some space here to discuss one of those mechanisms—micro-credit and risk insurance—in detail.

Micro credit can enable producers to move out of poverty and promote local and regional economic growth, by providing farmers with the capital they need to invest in new technologies and venture into more profitable agriculture. We mentioned evidence from studies conducted in Madagascar that support this view. Access to credit in that country was shown to be very limited, however. Furthermore, studies suggest that the provision of nation-wide credit coverage would be so expensive as to stand beyond the capacity of the State or any other institution. We review briefly below the literature on credit, concentrating on the design of credit schemes that maximize borrowers' food security; while increasing their sustainability and reducing public financial burden. Risk insurance for both producers and lending institutions is a key component of such schemes.

Food security-friendly credit programs. All agree on the importance of credit as production input. Several international studies, however, suggest that the design of the financial product is very important when food security outcomes are considered. Access to production credit has been shown to generate negative effects on borrowers' income and nutrition when the credit program is defined too narrowly (Diagne and Zeller, 1999). Tying credit to particular packages for a single crop, for instance, removes the flexibility that small holders need in adapting to their changing circumstances. Crop specialization may be more profitable than diversification but in the absence of crop insurance small farmers will generally chose to forego the increased income opportunities that come with specialization, in order to better spread their risk (Hazell et al, 1996).

The lack of crop insurance also leaves borrowers more exposed than non-borrowers to debt and bankruptcy when the region suffers adverse climatic conditions or catastrophic events (Hazell et al, 1998). As was demonstrated in an IFPRI study of micro finance in Malawi, households provided with credit on monocropping schemes had significantly lower per capita daily caloric

intake, and a higher prevalence of both chronic and acute malnutrition compared to households that did not use credit and monocropping (Diagne and Zeller, 1999). Similar evidence was documented in Guatemala, Ecuador and Senegal (von Braun et al, 1989; Thrupp, Bergeron and Waters, 1995; McKintosh, 1989). In all cases, the negative outcomes on nutrition were traced to shifts in the nature of income (from in kind to cash, because of monocropping) and in control over that income (from women to men).

These various findings suggest 1) the importance of pairing micro finance with crop insurance schemes (see below); 2) the importance for lending institutions of diversifying their financial products to suit the needs of their clientele—for instance, providing also for savings options or consumption credit; and 3) the importance of considering gender issues when designing the credit program.

Sustainability of credit programs. Financial institutions' perception of their own risk also affects the type and nature of credit programs they offer. Agricultural production is inherently a risky business, and lending institutions must be concerned about the ability of farmers to repay their debt. They seek to reduce the possibility of poor loan recovery rates in unfavorable years by restricting their lending to larger, more financially robust agricultural enterprises. Lending institutions are also concerned with covariate risks like droughts, when large numbers of borrowers can default simultaneously. Because large social consequences can follow from covariate risk and loan defaults, the provision of agricultural credit and crop insurance have traditionally been defined as public goods. Many governments in the past have taken it upon themselves to offer risk management programs for both farmers and lenders—crop insurance, price stabilization, drought relief, etc. As Skees et al mention however, “most have proved an expensive drain on the public purse and there is little evidence to show that these interventions have generated any sizeable social benefits, or that benefits exceed their costs” (Skees et al, 1999:2). They also tend to generate perverse incentives as they encourage over use or irresponsible producer behavior (the so-called “moral hazards”)—for instance, excessive risk taking (e.g. growing unsuitable crops in high risk regions) or reducing the incentives to perform. Reviewing traditional agricultural risk insurance programs, Hazell et al. (1996) also conclude that those were doomed to fail, because of moral hazard and unacceptably high costs to governments.

Faced with those problems, new models are being proposed that aim at reducing the risks to small holders and lending institutions alike, while reducing the drain on public expenditures by encouraging private initiative in this area. Skees et al (2000) examine new approaches that propose negotiable state-contingent contracts settled on area crop yield estimates or locally appropriate weather indices. The vehicle proposed is rainfall insurance contracts backed up by carefully collected meteorological data, and sold as standalone products—much as lottery ticket—redeemable in case a low benchmark is reached in rainfall patterns. “The essential principle of area-based index insurance is that contracts are written against specific perils or events (e.g. area yield loss, drought, or flood) defined and recorded at a regional level (e.g. at a local weather station). Insurance is sold in standard units (e.g. \$10 or \$100), with a standard contract (certificate) for each unit purchased called a Standard Unit Contract (SUC). The premium rate for a SUC is the same for all buyers who buy the same contract in a given region, and all buyers receive the same indemnity per SUC if the insured event occurs. Buyers are free to purchase as many units of insurance as they wish” (Skees et al, 1999:9). Financial institutions

would be more inclined to lend to any borrower, if some form of risk insurance of that sort was available. Recent developments with financial market instruments for spreading risks (e.g. re-insurance) have increased the opportunities for this kind of index insurance. USAID could support the development of such instruments by supporting start up activities, particularly: a) Funding the research cost of identifying key catastrophic rainfall events that correlate strongly with agricultural production and income in different types of agricultural regions; b) educating rural people about the value of rainfall insurance; c) ensuring secure rainfall stations; d) establishing an appropriate legal and regulatory framework for rainfall insurance; and e) underwriting the insurance in some ways until a sufficient volume of business has been established.

Another bottleneck in micro-credit programs is high transaction costs. Group- and trust-based lending schemes have proven quite valuable to reduce such costs, while decreasing risk to lending institutions (Zeller et al, 1996). Although much experience in this regard already exists, it needs to be brought up to scale in each setting. Pairing group based lending to revolving credit and savings schemes may also reduce the limited availability of loan capital, mentioned earlier in the text: micro-lending requires relatively little seed capital to operate, and can quickly raise enough funds to reach sustainability. CRS has creatively used the Credit With Education (CWE) approach in Toamasina to improve women's access to savings and loans services, while augmenting their nutritional knowledge and self-confidence. Alternatives of this type must be exploited whenever they exist, especially when they generate added value as CWE does.

Regulatory problems, finally, were mentioned as another problem hampering the development of micro-credit lending in Madagascar. USAID can contribute to the national level debate by funding studies that examine alternative modes of operation and regulation, with a goal to create an enabling environment for financial institutions at all level, free from unnecessary controls.

Education

Education was mentioned in the introduction as a key lever in enabling the poor to move out of their condition. Our review of the situation in Madagascar however indicated that the poor are less likely to get education, as they are less able to afford the direct and indirect costs associated with schooling, and have less access to schools because they tend to live in more isolated areas. Also, the poor quality of education provided in Malagasy schools has been mentioned as a disincentive to schooling. As a result, Madagascar has the dubious honor of being one of the few countries in the world where the current generation of school age children is less educated than its parents.

The Government of Madagascar has declared its intent to continue supporting education as a key area of social intervention, and the DSRP recommends that resources be directed where they are most needed, i.e. in rural areas and in the poorest regions. However, the amount of public resources that will go in this sector remains small compared to the need, and alternative means should be sought to expand education, for instance by enlisting support from private actors.

The privatization of education has been attempted in various countries, with mitigated success. In some cases, such as Chile, privatization has allowed to open opportunities to remote populations while ensuring quality education at an affordable cost. In other cases, such as Haiti,

where 85 percent of the schools are private, the quality of education in the private sector is considered very poor. Schools were described to be at best substitute childcare centers, and at worst an extortion mechanism (Locher, 2001). To improve quality, USAID/Haiti is considering using food aid as an incentive to promote school reform in the private sector, through a Food for Education program. Similar approaches could be used in Madagascar, using school feeding as a leverage to negotiate a program of reforms with each participating school to improve educational quality. Additional resources could be channeled to pay for some of the most needed improvements, particularly with respect to teacher training and curriculum development (Delaighe and Miauton, 2001). Parallel discussions could be held with the Ministry of Education to open up possibilities for private educational operators.

The effects of improved education will only be felt over the long run, however. In the short term the best option is to increase extension in productivity enhancing technologies, as suggested above under the Agricultural Technologies and Extension subsection.

Markets and prices

The regulatory structure for market operation is sound, but a host of problems impede its smooth operation. Chief among them is infrastructure, which creates problems with inter-regional commodity movements, price connections, and fosters the development of trading monopolies. This question was examined under the Food Availability Chapter. Other market issues that directly impinge upon food access are the seasonal variability in price, which affect the quantities that can be purchased, or the incomes that can be generated from market operations. Since the poorest households are usually net buyers, they are seriously affected by this variation. On farm or community storage could smoothen those fluctuations, yet this is not much practiced. Also, research has shown that soft infrastructures (banks, extension, access to inputs) have beneficial effects on price levels and variability, and that access to formal and informal credit sources reduces the seasonal spread significantly in rural areas. Those considerations suggest that the best approach to address fluctuations in market prices is, on the one hand, to work on extension, credit and physical infrastructure (along the lines previously discussed); and on increasing local storage of food, on the other.

The monetization of food aid has also been used as a way to foster market diversification and break monopolies, thus favoring more open and more competitive markets. In Uganda for instance, a consortium of Title II Cooperating Sponsors uses monetization of Title-II commodities to foster market competition and lower the entry barriers to the commercial food sector. This is done by purportedly requesting monetization commodities to be provided in smaller containers, making it easier for small operators to bid for those commodities and to compete with monopolistic interests in the market (ACDI/VOCA DAP 1998).

Food Access in Urban Areas

Food access for urban dwellers depends more on households' purchasing capacity than on their agricultural production—although the latter remains important in Madagascar's cities, where urban agriculture is common. Purchasing capacity is determined by prices and by income levels. Prices for rice have doubled over the last decades, whereas prices of manioc and maize have gone down. All crop prices show important seasonal fluctuations in urban contexts, which can

seriously affect the purchasing power of the poor. There is evidence of cross-elasticities among the urban poor between rice and manioc related to those price changes.

Monetary incomes levels have increased nominally over time but the acquisitive capacity of this income has remained more or less stable over time. Because of price variations, less rice but more manioc and more maize can be purchased today with the same wage than ten years ago.

Actions to address food access in urban areas should aim at improving prices (and price stability), and on increasing households' purchasing power. As mentioned earlier, improving agricultural production conditions in rural zones (particularly access to credit and to soft infrastructure) will reduce price fluctuation both in rural and urban areas. Also, any research that ends up lowering the cost of food will benefit urban dwellers, who are net purchasers of food. As for increasing household purchasing power, the creation of employment provides the best approach. In urban areas as in rural ones, formal education and life skills acquisition represent essential interventions for long term individual economic improvement. In the shorter term, skill training in areas where needs exist but are untapped, provide excellent opportunities. CARE's Title II Mahavita program has done excellent work in creating employment opportunities around urban infrastructure and sanitation needs. Such scheme address food security from the twin angle of improved food utilization (though healthier environments) and food access (through income generation).

CHAPTER 5: FOOD UTILIZATION IN MADAGASCAR

Food utilization interventions are concerned with ensuring that individuals have the biological capacity to use food so they can lead healthy and productive lives. In Food Security programs, Food Utilization is often represented by a person's nutritional status. Nutritional status is affected by macro-nutrient (protein and energy) and micro-nutrient (mainly Vitamin A, iron, and iodine) intake; by the person's health status and by caretaking—particularly important for children, both during healthy and illness periods.

The nutritional status of an individual is in a large measure determined during the first years of life, when the most critical periods of growth take place. Most of the functional impairments resulting from malnutrition are inflicted before two years of age. Growth faltering, however, may begin before birth, starting in-utero and continuing after birth if feeding practices are not appropriate. Once a child reaches two years of age, the damages from impaired growth will be permanent thereafter. Early malnutrition has particularly damaging consequences for women and their offsprings: growth failure in female children leads to small adult women; small maternal size and poor nutrition of pregnant women leads to low birth weight; and low birth weight leads to subsequent growth failure in children. Thus the vicious cycle of malnutrition is driven by inter-generational links. Adolescent pregnancies further contribute to this vicious cycle through the impairment of the mother's growth and the increased incidence of low birth weight.

The programmatic implications from this scenario are clear. To break the inter-generational cycle of malnutrition requires (i) that the nutritional status of all women of reproductive age be improved; (ii) that the age of first pregnancy be delayed until the women has reached her full growth; (iii) that fetal nutrition be improved to prevent intra-uterine growth retardation; and (iv) that optimal nutrition be ensured from birth to 24 months. The latter includes protecting the life and health of the child so that she is able to take maximum advantage of the food ingested.

Maternal and Child Health and Nutrition in Madagascar

According to MICS 2000, infant mortality rate in Madagascar is 83 per thousand, and child mortality rate is 133 per thousand. Put otherwise, approximately one of every eleven children dies before reaching 12 months of age, and one of every six children dies before five years of age. A *Profiles* analysis, sponsored by USAID in collaboration with the Linkages project, showed that protein-energy malnutrition is a potentiating factor in 54 % of those deaths, making it the single most important cause of death among children less than 5 years of age. These mortality rates are very high, and they have changed very little over the last twenty years, particularly in rural areas.

Maternal Health and Nutrition

An important underlying cause of high child mortality rates is the poor nutrition of mothers. In Madagascar, one of every four babies is born with a low birth weight. The probability of death among those children is twice that of children born with normal weight. To reduce low birth weight, the health and nutrition of women has to be protected throughout their life cycles—childhood, adolescence and reproductive years. Pregnant women have to be fed adequately, provided with adequate micro-nutrients, and followed with prenatal care.

Levels of maternal malnutrition in Madagascar are among the highest found in Sub-Saharan Africa, with about 21 percent of women categorized as malnourished using the criteria of low body mass index (BMI). Iron deficiency anemia (hemoglobin value below 12g/dl) is also very high, affecting 42 percent of women of reproductive age. Anemia is most severe among pregnant women and rural women (DHS 1997).

Overall, 46% of women benefit from assistance at delivery from qualified health personnel (MICS 2000). The proportion is higher in urban areas (71%) than in rural ones (41%). Large differences are also noted between regions, with Antananarivo having the highest proportion of births attended (61%) and Fianarantsoa the least (33%).

Table 10: Birth Attendance Services: Percent of Women that:

	Country	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
Gave birth assisted by trained staff	46	61	36	33	37	43	39
Received one dose of VitA	12	19	13	11	3	11	7
Received 2 TT doses or more	57	64	65	65	44	57	44
Infant with low birth weight	12	5	10	16	16	18	12

Source: MICS 2000 (preliminary results)

Few women (12% overall) receive Vitamin A supplements after delivery.¹ This is more available in Antananarivo (19%), and least in Mahajanga (3%) and Toliary (7%). 57% of all women overall receive at least two doses of tetanus toxoid, with coverages above average in all provinces except for Mahajanga and Toliary (44% each).

Those figures suggest that much remains to be done in the area of maternal health and nutrition in Madagascar. Particularly, the low coverage of vitamin A distribution, and the high levels of iron deficiency anemia, are alarming. The provision of qualified health assistance at delivery is also deficient, particularly in rural areas.

Infant and Child Health and Nutrition

Besides low birth weight, inappropriate infant and child feeding practices (the caretaking component) are a major cause of mortality and malnutrition among children. Five recommendations are usually proposed to improve infant and child nutrition:

¹ The MOST project recently conducted a detailed study of Vitamin A in the country with USAID funding. Results are not yet available, however. Figures mentioned here are from the MICS 2000.

1. Promote exclusive, on-demand breastfeeding until six months of age.²
2. Initiate breastfeeding within one hour after birth.³
3. Promote appropriate feeding practices from 6 to 24 months.⁴
4. Promote appropriate child feeding practices during and after illness.⁵
5. Promote vitamin A intake for children 6-72 months.⁶

Breastfeeding is virtually universal in Madagascar, and usually lasts over one year. Exclusive breastfeeding, however, does not last long enough, according to the 1997 DHS. Over 78% of infants were exclusively breastfed through the first month, but by three months of age, only 49 percent of infants were still exclusively breastfed; and by six months, only 22% of children are still exclusively breastfed (DHS, 1997). Less than 35% of newborns were breastfed within an hour of life. During the first three days of life, many infants are given liquids other than breast milk, such as warm water, rice water, coffee and fruit juice. The introduction of inappropriate complementary liquids and foods in the early months places infants at high risk of diarrhea and other illnesses, which contribute to the serious rates of growth failures noted among children in Madagascar.

Most children (87%) receive complementary foods in addition to breast milk by the age of six or seven months. At 20 months, 54 percent of infants are still breastfeeding. A study of child feeding practices found that by one year of age, most children are fed the daily family meal, which typically consists of rice, in addition to breast milk and some snacks. Based on the energy density of boiled rice or maize porridge, a child at 12 months of age would have to eat to her full stomach capacity three to five times a day to satisfy her minimum daily energy needs (BASICS, 1996). The quantity, quality, density and frequency of complementary food is judged inadequate for two thirds of all children between 6 and 24 months of age (MICS, 2000).

The proportion of children with gastro-intestinal diseases that are treated appropriately (i.e. using ORT) is above 90 percent in all provinces (MICS 2000). Fewer children are fed appropriately during diarrhea episodes, however, and less than half receive more liquid during their illness. There is a large potential for improved nutrition education in all those respects.

² Exclusive breastfeeding will fully cover the infant's nutritional and fluid needs for the first six months of life. Infants should never receive any water, liquids, or ritual foods to maintain good hydration. Offering water and foods to infants before six months is both unnecessary and dangerous because it reduces breastmilk intake, interferes with the absorption of breastmilk nutrients, and introduces pathogens and contaminants that put the infant at a greater risk of illness and death. Exclusive breastfeeding will contribute as well to delaying the return of fertility.

³ Initiating breastfeeding early will stimulate the production of breast milk and provide the infant with the antibodies present in colostrum. This will be the baby's "first immunization".

⁴ At six months, breast milk alone cannot meet infants' energy, protein, and micronutrient requirements. Adequate complementary foods need to be introduced at this time. Children should continue to breastfeed on-demand (including night feeding) until 24 months and beyond as breast milk remains a very important source of energy, protein, fat, micronutrients, and safe water, and continues to reduce the risk of infection, especially diarrheal diseases. Continued on-demand breastfeeding will also help reduce fertility through lactational amenorrhea.

⁵ During and after illness mothers should breastfeed their young children more frequently. Sick children often will accept breastfeeding even when they refuse other foods, and breast milk may become their most important source of nutrients and safe water. Caregivers of children 6-24 months should practice frequent active feeding (positive reinforcement, persistence, and supervised feeding) to overcome children's poor appetite during and after illness.

⁶ Local food rich in vitamin A (e.g. sweet potato, mango) should be provided to children early in life, and throughout their childhood. When vitamin A-rich foods are not available or accessible, vitamin A supplements should be given. Optimally, supplementation should start at six months of age and children should receive supplements containing appropriate levels of vitamin A every six months until they are six years old. In case of clinical signs of vitamin A deficiency or measles, children should be given full dose treatment of vitamin A.

Table 11: Child Feeding Practices During Illnesses (in %)

	Country	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
Children w/diarrhea fed appropriately	76	75	74	88	70	68	78
Children w/diarrhea treated appropriately	95	98	97	99	94	94	87
Children w/diarrhea receiving more liquid	43	54	42	37	53	41	34

Chronic malnutrition in children, resulting in stunting or low height for age, is an indication of long-term under-nutrition and poor consumption. In Madagascar, one of every two children is stunted at 24 months of age (-2 zscore). According to UNICEF's State of the World Children 2000, this is the second worst performance in Sub-Saharan Africa, faring better only to Ethiopia. According to the 1997 DHS, stunting is more prevalent in rural areas (49%) than in urban areas (45%); and male children are slightly more vulnerable (52%) than females (45%). The highest rates of stunting are found in Antananarivo (57%), Fianarantsoa (51.6%) and Toamasina (47.8%); and the lowest ones are found in Toliara (36.5%)⁷ and Antsiranana (37.1%).

Wasting, or low weight for height, indicates acute malnutrition. Wasting is a reflection of current nutritional intake and is useful to assess nutritional status during emergencies. The prevalence of moderate (-2 zscores) and severe (-3 zscores) wasting in Madagascar, according to the 1997 DHS, was estimated to be 7.4 and 0.9 percent respectively. Wasting was more prevalent in rural areas (7.9 percent) than in urban areas (5.3 percent). The highest prevalence of wasting was found among children 12 to 23 months old. Geographically, wasting is most severe in Toamasina (9.3 percent) and Antananarivo (7.9 percent), and least in Antsiranana.

Low weight for age (underweight) combines the effects of chronic and acute malnutrition (wasting and stunting). According to the DHS 1997, 40% of children are underweight.⁸ The rate of underweight children is greater in rural areas (31%) than in urban zones (36%) and there is no difference in the rate of underweight between girls and boys. As with chronic malnutrition (stunting), the provinces most affected by low weight for age are Antananarivo and Fianarantsoa (44% each), and Toamasina (40%).

⁷ This is surprising: as seen earlier, Toliary is where levels of market access, household incomes and agricultural production are lowest. This is also where vulnerability to drought and locusts is most serious.

⁸ This compares poorly with other sub-saharan countries such as Senegal, Ivory Coast or South Africa where underweight rates are 24, 12 and 9% respectively.

Table 12: Child Malnutrition in Madagascar (-2 zscores)

	Country	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
Stunting at 36 months of age	48.3	57.0	37.1	51.6	41.0	47.8	36.5
Wasting at 36 months of age	7.4	7.9	4.2	6.4	7.2	9.3	7.6
Underweight at 36 months of age	40.0	43.8	31.8	44.1	34.2	40.2	34.3

Source: DHS 1997

Those figures reveal that the nature of problems varies considerably between zones. It is certainly surprising to see Toliara, with its remoteness and low levels of agricultural productivity and poor household incomes faring best in terms of chronic malnutrition.⁹ At the same time, the fact that it fares among the worst in terms of acute malnutrition reveals the underlying uncertainty that characterizes the agro-ecology in this region and the many shocks that constantly hit household economies. It is worth noting also that, although the rates are appalling everywhere, some provinces seem to consistently fare worst overall than others. Antananarivo, Fianarantsoa and Toamasina clearly stand out as those with the greatest problem; whereas Antsiranana and Mahajanga seem to fare the best. The overall lesson, in terms of combatting malnutrition, seems to be that no “one-size-fits-all” approach will do: solutions have to be carefully adapted to each context.

Immunization

Immunization is critical to protect the health of children and maintain their capacity to absorb and utilize food. The most up to date information on vaccination coverage is provided by the 1999 Enquete Permanente des Menages, published in 2000. Overall vaccination coverage is often summarized using the BCG coverage rate. Using this as a proxy, 70 percent of all children 12-23 months of age have been immunized. However, only 38,3 percent are fully immunized and 20,3 percent have not received any protection.

⁹ This may reflect the considerable investment made by the international community in this region, which is—nonwithstanding its isolation—one of those with the best health service coverage in the country.

Table 13: Immunization Coverage of Children 12-23 Months, 1999 (in %)

	Country	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
BCG	69.9	86.5	71.0	79.4	35.5	66.4	59.8
DTC1	69.8	85.2	72.1	77.4	39.4	69.6	57.0
DTC2	65.9	82.8	66.3	77.0	31.5	65.5	50.9
DTC3	63.3	79.7	66.3	73.8	30.9	62.4	47.3
Polio0	52.6	56.2	58.4	51.3	54.7	51.2	45.1
Polio1	76.3	86.3	83.5	78.4	59.1	79.2	64.0
Polio2	69.3	81.9	71.1	77.4	43.3	69.8	56.9
Polio3	57.7	70.9	58.6	70.7	29.6	54.8	43.6
ATR (measles)	44.5	62.3	45.6	47.5	18.5	39.9	34.9

Source: EPM, 1999

Looking at the other key immunization figures, 63,3 percent of children have received the three DTC, and 57,7 percent, the third polio vaccine. Measles are trailing behind, with 44,4 percent of all children having received their immunization. In all cases, the rates vary markedly by Faritany, with Antananarivo generally coming ahead, and Mahajunga coming last, followed by Toliara. Measles coverage in Mahajunga is particularly poor, with less than 20 percent of children being reached. Factors that appear to affect coverage rates are residence (urban vs rural) and mother's education.

The figures show slight improvements in coverage rates over the 1997 EPM. Also, there is some improvement in reaching children before they complete their first year of life. Notwithstanding those improvements, much remains to be done to ensure adequate immunization coverage among the population.

Water and Sanitation Services

The existence of water and sanitation services are important additional elements in determining the population's health status, and thus their capacity to use food. There are contradictory reports on the issue of water and sanitation in Madagascar. All reports, however, agree that coverage for safe water and availability of sanitation infrastructure at the household level are woefully inadequate. The most recent information to date, as provided by the MICS 2000 survey data, indicates that only one of every four household in Madagascar has access to safe water. Only households in Antananarivo are above the national average. At least 75% of families from all other provinces have no access to safe water. Similarly, sanitation infrastructure are sorely lacking in most provinces, with none of the provinces (except Antananarivo) having latrines in more than 10% of homesteads.

Table 14: Water and Sanitation in Madagascar by Faritany (in %)

	Country	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
HHs with excreta disposal system	7	12	5	4	7	4	4
HHs with access to potable water	25	43	21	10	19	14	25

Source: MICS 2000 (preliminary results)

Family Planning Services, Reproductive Health and the Prevention of STDs

Family planning and reproductive health relate to food security in three main respects. First, as was mentioned earlier, it increases food availability: smaller families result in fewer mouths to feed, and more food going to each person. Second, it increases food utilization, by protecting the health and nutrition of mothers and their children. Delaying the age of first pregnancy reduces the likelihood of low birth weight. Reducing the total number of pregnancies and increasing birth intervals lessens the likelihood of maternal depletion and the resulting poor capacity of mothers for childbearing and caretaking. Third, the incorporation of STD and/or HIV/AIDS prevention components affects food access. It is now recognized that HIV/AIDS has several negative impact on food access, as it deprives the family of its most productive labor force. Also, the costs of drugs and medications drain family resources. Family planning IEC sessions provide a good point of entry for raising HIV/AIDS awareness among the population.

Family planning and reproductive health services are weakly present in the country overall, as attested by the MICS 2000 results. For the country as a whole, less than 19% of all women used any contraceptive at all, and only 12% of them used modern contraceptives. Until the Linkages project began advocating for the use of the Lactational Amenorrhea Method (LAM) in 1999, there were no concerted efforts to promote LAM within family planning services, and its practice was not documented.

Awareness of how to avoid HIV/AIDS is low, with 30% of all women being able to identify three ways to avoid infection. Where this is least known is in Toliara and Fianarantsoa provinces. Therefore, there is much room for improvement in Madagascar in terms both of Family Planning, and in the prevention of STDs and HIV/AIDS.

Table 15: Family Planning and HIV/AIDS Prevention (in %)

	Country	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
Use modern contraceptive	11.8	16.0	14.6	7.3	8.8	12.1	9.5
Use any contraceptive	18.8	28.3	21.9	11.0	13.7	18.3	12.4
Know how to avoid HIV infection	30	43	40	19	22	34	16

Source: MICS 2000 (preliminary results)

Health and Disease Burdens in Madagascar

The disease burden is high in Madagascar. When considering all age groups in the population, one of every ten individuals visited by the EPM in 1999 suffered from a health problem during the two weeks preceding the interview, with a higher prevalence of disease affecting rural populations than urban ones. Looking at diseases across socio-economic and age-groups, the lowest quintile suffered proportionately more illnesses, particularly transmittable diseases, than the highest quintile; and the younger age-groups were more affected than older ones (disease rates among children are discussed in more detail below). Geographically speaking and still considering the population as a whole, illnesses are more frequent in Toamasina and Toliara than elsewhere. Malaria and acute respiratory infections (ARI) are the diseases most frequently cited overall. Malaria is particularly severe in Mahajanga, whereas ARI are most prevalent in the highland provinces Fianarantsoa and Antananarivo. Diarrheal diseases, although less severe when considering the population as a whole, affected younger age groups more so than older ones in fact, becoming the main source of child illnesses (see below).

Table 16: Main Diseases by Province (in %)

	Country	Antananarivo	Antsiranana	Fianarantsoa	Mahajanga	Toamasina	Toliara
Malaria	25.8	19.1	17.9	18.9	49.1	27.7	23.3
Diarrhea	8.5	10.1	19.3	8.2	0.2	8.1	9.5
ARI	23.3	31.1	14.1	36.3	16.6	16.7	19.3
Other (incl. wounds)	42.4	39.8	48.6	36.6	34.0	47.0	47.9

Source: EPM, 2000

When looking at the distribution of diseases by age group, the incidence of illnesses is much higher in children less than five years of age (22%) than among the older age groups. Also, the distribution of illnesses changes markedly: diarrhea becomes most prevalent (41% of illnesses) followed by malaria (25.6%) and IRA (23.6%) (note that those figures do not include malnutrition, which is considered separately by the EPM).

The data plainly reflects the particular vulnerability of the younger age groups and the importance, for that segment of the population, of health interventions—particularly preventive ones such as vaccination and proper feeding practices. Unless those areas are emphasized, food security interventions may be diluted to the point of canceling out their beneficial impacts.

Cholera

In addition to the “traditional diseases” (malaria, ARI and diarrhea), one now has to add cholera, which entered Madagascar in March 1999. By February 2001 a total of 40,525 cases were reported resulting in 2,307 officially registered deaths. Cholera affected first the Mahajanga Province from where it spread in epidemic proportions to about 66 out of the 111 districts of the country. At present Toliara is most severely affected.

Several initiatives are now in place to fight cholera. A National Committee for the Fight Against Cholera has been established in which CNS plays a coordinating role. The USG is a major donor

in this effort. Funds from OFDA and USAID, coupled with resources from CDC, CARE, UNDP and WHO, have allowed the creation of a partnership between PSI, CARE and the CDC to provide safe water kits (Sur'Eau) to households at nominal prices.¹⁰ The USAID-funded JSI project, working within the MoH structure, has supported the development and broadcast of nationwide TV and radio spots promoting hygiene, sanitation and safe drinking water practices. In its focus areas of Antananarivo and Fianarantsoa, JSI also provides training refreshers for health workers and community groups on prevention and control of diarrhea episodes; while CRS has developed an IEC campaigns and initiated disinfection in Toliara and in Mahajunga. Other efforts include UNICEF's provision of drugs and supplies to Government Health Centers; the French Cooperation's epidemiological tracking of the disease and material assistance to the National Committee for the Fight Against Cholera.

HIV/AIDS

Until recently, HIV rates appeared to be relatively low in Madagascar: out of a population of over 15 million, only 248 HIV cases had been officially reported as of 2000. Results from more recent surveys indicate however that HIV prevalence among STI patients is now over 1% in five out of eight sentinel sites. These new data suggest that Madagascar may now be experiencing an acceleration in the spread of the epidemic. The extremely high STI rates along with limited access health and social services and widespread poverty provide ideal conditions for rapid spread of HIV to the general population and it is feared that an explosive epidemic in Madagascar is eminent if nothing is done.

The USAID Mission's strategy to prevent the spread of HIV, in place since 1997, focuses on reducing the STI rate among high-risk populations; and promoting an integrated approach to HIV prevention in six target areas through condom social marketing, behavior change communication and improved STI services. In addition, the strategy calls for improving the treatment of STIs and ensuring a consistent drug supply; supporting pilot studies in integrating STI/HIV prevention into family planning services; raising policymaker and public awareness; conducting research into behavior change messages; and strengthening the capacity in the NGO sector. Efforts to manage and prevent STIs and condom social marketing will remain a high priority for the new Mission country strategy for 2003-2008. In addition, expanding targeted interventions to reach a greater proportion of the vulnerable populations including expansion to emerging "hot spots," such as the sapphire and ruby mining areas, truck routes, and cattle markets.

Actions Undertaken to Address Maternal and Child Health and Nutrition

Actions by the Government of Madagascar

Currently, the Ministry of Health maintains a District Medical Officer and a support team that includes an IEC officer in every one of the 111 districts (fivondronana). At the community level, the Ministry works through voluntary health agents, supervised by the district health workers. The Ministry of Health has also planned to position two nutritionists in each province, but this objective is not met right now, due to the lack of qualified personnel and resources. Human resources in nutrition are very few in the country. The Ministry of Health has created a "Service de Nutrition (SNUT)" at the central level, to represent the government in the area of nutrition.

¹⁰ A 500ml bottle of chlorine solution

The Ministry of Health also promotes a “Baby Friendly Hospital Initiative” with support from various donors, including USAID – thru the LINKAGES Project - and UNICEF. As of 1999, fifty-three health facilities had adopted Baby Friendly criteria.¹¹

The GOM is well aware of the gaps that exist in its nutrition interventions, both in terms of coverage and of quality of services. It has resolved to increase per capita spending in real terms; to improve the quality of service by allocating resources in accordance with efficiency criteria; and reduce costs by initiating a cost recovery scheme (SPPM, 2000). These initiatives will certainly help. However, it readily appears that they will not be sufficient, and external actors will in all likelihood continue to play a major role in supporting nutrition in Madagascar.

Actions by USAID and Other Donors

A key resource for nutrition in Madagascar is the Intersectoral Group for Nutrition Action (“Groupe d’Action Intersectoriel sur la Nutrition”, known as GAIN) which was set up in 1997 to coordinate stakeholder actions in the area of nutrition. GAIN is comprised of more than 75 institutional members representing the Government, international donors, PVOs as well as local NGO groups. It supports a number of working groups on nutrition-related topics such as weaning foods, IEC/BCC, maternal nutrition, and breastfeeding. GAIN has proven a very valuable mechanism to foment discussion and achieve consensus on key nutrition issues. Remarkable achievements have been reached, for instance, in harmonizing key nutrition messages across the different group members, in developing a national nutrition IEC strategy, in standardizing micro nutrient protocols, and in supporting the analysis and dissemination of information.

Some of the most important support for GAIN in the past has come from USAID, particularly through the close involvement of the LINKAGES project. LINKAGES, with its focus on nutrition, provides a key role on behalf of the USAID Mission in the following nutrition related areas: support to the GAIN on breastfeeding, complementary feeding, maternal nutrition and LAM issues; the implementation of a large-scale nutrition behavior change community based program in 10 districts with the JSI bi-lateral project in reproductive and child health; technical assistance in the form of training of trainers to other USAID-funded projects that work in maternal and child health and nutrition (such as CRS’s Food Assisted Child Survival (FACS) program as well as ADRA’s community activities in food security and maternal and child health); training on breastfeeding / LAM to private sector medical doctors trained by PSI; support to the Ministry of Health in its BFHI and new Baby Friendly Workplace Initiative in the duty-free factories where an estimated 100,000 women work; as well as spearheading with the Government the reform of the existing pre-service nutrition training given to para-professional and medical doctors. With the MEASURES III Project, LINKAGES was also instrumental in organizing the PROFILES workshop in 1999. More recently, to support the overall promotion of infant and young child nutrition as well as LAM, LINKAGES initiated a mass media campaign (through radio and TV spots) targeted at mothers and child caretakers using a local music celebrity to promote key nutrition messages.

Another important USAID-supported player is the Jereo Salama Isika bi-lateral project ((which means “Look we are healthy” in Malagasy. The JSI acronym also happens to coincide with that

¹¹ A Linkages report however mentions that these criteria are loosely applied, and the facilities need better monitoring. See Quinn et al, 1999: 11.

of John Snow International, who is implementing the JSI project). JSI, with its strategic objective of “Smaller, Healthier Families”, is the centerpiece of USAID/Madagascar’s interventions in reproductive and child health. It follows on from two earlier projects, also funded by USAID—the MSH/ APROPOP reproductive health project; and the centrally-funded child survival BASICS project, both of which ended in 1998. JSI focuses on three key areas: 1) reproductive health (family planning, STDs and safe motherhood); 2) child survival (IMCI, EPI and nutrition); and 3) community empowerment (short term skills training, IEC/BCC in reproductive health and child survival). The entire nutrition portfolio of the JSI bi-lateral project, in fact, is implemented by the LINKAGES project under the joint field partnership mentioned in the preceding paragraph. Up through 2000, JSI and LINKAGES has worked in 10 focus districts of Fianarantsoa and Antananarivo covering a population of about 3.2 million. Plans to expand upwards are now being rolled out: JSI / LINKAGES will work in 42 districts (20 intensive and 22 less intensive), covering 7.5 millions people, with staff maintained at district, regional and central levels. The approach taken by JSI and LINKAGES to reproductive and child health stems from the earlier IEC/BCC strategy developed by the BASICS project. BASICS, which phased out in 1998, left behind a set of tools—the child health and nutrition counseling cards and an innovative community IEC/BCC strategy that uses a newsletter, radio spots and village theater—which are still in use by many different organizations, both public and non-governmental. JSI and LINKAGES have built upon the foundation laid by BASICS but have further strengthened the behavior change component by incorporating the elements of ‘negotiation’ into the short-term skills-based training given to community members (especially women groups) and health workers. On the nutrition side, impressive results have been achieved to date especially in breastfeeding improvements. A Rapid Assessment carried out by LINKAGES in September 2000 showed that in only about 9 months of implementation, rates of early initiation of breastfeeding were 73% in project sites as compared to 36% in control sites. Rates of exclusive breastfeeding were also dramatically higher in project sites, 68%, as compared to control sites, about 47%.

IMCI was adopted by the Ministry of Health as its national child survival strategy in 1994. USAID was the first donor to step forward to support IMCI introduction in Madagascar. Revision and/or development of new policies for various preventive and treatment protocols were required.

Specific to nutrition, new vitamin A and deworming protocols have been introduced. The first formal IMCI training began in February 1998, after the adaptation of the IMCI algorithm and the preparation of training materials was completed. Adaptation included the use of TIPS methodology (Trials Practices) to tailor nutrition counseling messages for caretakers of sick children. Initially introduced in two BASICS-supported districts, the approach was adopted by the MOH and underwent a rapid expansion to reduce the high child mortality rates. IMCI is now a priority program with a national objective to train all health workers by 2002 through a distance learning methodology.

In 2000, Linkages began working with the two medical school and with the six para-medical schools (plus one private) on revising the nutrition curriculum to introduce the Nutrition Essential Actions. At the same time, JSI introduced IMCI into pre-service training. All public pre-service training institutions have introduced IMCI I their curricula in 2001; this initiative

resulted in tremendous cost savings compared to in-service training (\$50 versus \$500 per person trained).

Another set of important, USAID-funded actors in nutrition are the P.L. 480 Title II Cooperating Sponsors (CSs), particularly ADRA and CRS. In collaboration with the Catholic Church of Madagascar, CRS uses its Title II resources to operate a Food Assisted Child Survival (FACS) program in twelve dioceses of the country. CRS screens all children below three years of age using monthly growth monitoring (GM) sessions, and provides food rations for supplementary feeding to mothers of children found to be malnourished. CRS also distributes supplementary food rations to all breastfeeding women and pregnant women. The GM sessions are further used to provide nutrition information to mothers using CRS's well established IEC/BCC model. In addition, in collaboration with Freedom from Hunger (FFH) and the Caisse Populaires Desjardins, CRS is operating a pilot Credit With Education (CWE) program in the Toamasina province. This promising approach combines nutrition-related messages with the teaching of business and credit skills to poor women. Studies conducted in other contexts have shown this approach to be very effective in motivating behavior change, in addition to increasing women's income earning opportunities (FFH, 1999).

ADRA is implementing a child survival project in Toamasina, in collaboration with the government's District Health system.¹² This centrally funded project aims at improving the capacity of health service delivery through community-based promotion of breastfeeding, immunization, diarrhea disease control, and STD/HIV/AIDS. The project will provide support to the communities falling under 24 health centers. In addition, ADRA receives Title II funding to operate a food security project in the Moramanga region of the Antananarivo province. The project, which mainly focuses on agriculture and natural resources management, also includes a family planning component, disseminated through the Model Farmers training program.

Besides the USAID-funded projects, actors that also play a key role in nutrition in Madagascar are the World Bank, through its SEECALINE project; UNICEF; the World Food Program; the European Community; and the Cooperation Française.

The SEECALINE project, supported by the World Bank, has been supporting community based growth monitoring, food security and school feeding programs since 1992. Initially based in Toliara and Antananarivo, the program's geographic coverage was expanded in 1996 but the food security interventions were discontinued and the program refocused more narrowly on nutrition. An important legacy of the first phase of SEECALINE was the series of workshops organized by a working commission with local experts, which led to the publication of the SEECALINE food security strategy in 1997. Using EPM data, the studies proposed a detailed analysis of the food security situation in each of the six faritany, and specific axes of interventions for each. The strategy was later utilized by the GoM to establish the national food security policy.¹³

SEECALINE, which works through local NGOs, the MoH Health Centers and the MoE schools, now reaches 4,1 million people (23 percent of the population) of which 900,000 are children

¹² Note that ADRA's Child Survival project is not funded by Title-II but by BHR Child Survival Grant

¹³ The GoM never implemented the strategy, however. Instead it was subsumed under the PADR

under three years of age, and 450,000 are malnourished. In addition, 363,000 pregnant women and 363,000 lactating mothers are provided with services, including supplemental food rations, as well as one million enrolled primary school children, and 1.5 million non-enrolled children between the ages of 3 and 14 years old.

There have been some preliminary discussions between the USAID-funded LINKAGES project, and the World Bank, to improve the training of community health workers, mainly by strengthening the capacity of the SECALINE IEC team. Given LINKAGES proven track record in this area, and the considerable resources managed by SEECALINE, such a merging of strengths has promising potential to reduce malnutrition.

UNICEF, along with the World Bank and USAID, has been one of the major players in nutrition in Madagascar. It was a cosigner of the MOU on Nutrition with USAID, which led to the organization of GAIN. It has also worked closely with BASICS in the past, to pilot test the IMCI approach in its field sites. Furthermore, UNICEF has been one of the key promoters of the Baby Friendly Hospital Initiative, providing mainly training in IEC and social mobilization. UNICEF is also playing an important role in the area of fortification: its promotion of a salt iodization program has led to the adoption of policies in this regard, and it is now discussing with the GoM the implementation of regulatory guidelines for the fortification of sugar with Vitamin A. In addition, UNICEF is active in the field through its community-based NAC program, which uses the well-adapted Triple-A cycle and Nutrition Conceptual Framework as organizational principles. As part of its community-based programs, UNICEF supports IEC on health, nutrition, and hygiene; health service outreach (EPI, antenatal care, deworming, Vitamin A supplementation). On these issues, there is good coordination with the USAID-funded LINKAGES and JSI projects.

Future Directions in Food Utilization

Several areas emerge from this review of food utilization issues in Madagascar. On the one hand, it is clear that considerable work has already been accomplished.

- Mechanisms for institutional coordination are already in place, through GAIN.
- Broad consensus already exists among key stakeholders as to the key nutritional needs of the population in Madagascar.
- Many tools have been validated in the field, and are ready to be used by field operators (IEC/BCC, IMCI, BHFI, CWE, Child to Child).
- Government interest in nutrition is high, and policies are already in place that create the appropriate facilitating environment for simultaneously “scaling up and scaling down nutrition” (i.e. expand proven programs, while decentralizing their operation).

On the other hand, there are many aspects of current programs that have not yet met with complete success, but remain essential to an effective nutrition program, and therefore still need to be achieved. In the area of maternal health and nutrition:

- Deliveries attended by trained staff are still infrequent
- Very low coverage of Vitamin A distribution among lactating mothers
- Still high rates of low birth weight

- High levels of iron-deficiency anemia among women of reproductive age

In the area of child health and nutrition, levels of malnutrition also remain unacceptably high. Our review of the data showed that :

- Exclusive breastfeeding rates are very low among infants less than 6 months of age
- Few newborns are fed breast milk within the first hours of life
- Inappropriate complementary feeding after six months of age
- Very poor availability of potable water and sanitation infrastructure

In the area of reproductive health services:

- Weak presence of family planning and STD/HIV/AIDS services
- Low levels of knowledge about the prevention of STD/HIV/AIDS

Finally, some directions may be pursued that have apparently not been explored in details yet. The following are some suggestions in this regard.

- As part of reproductive health services, delay the age of first pregnancy until after adolescence (when a woman's growth has ceased) and increase birth intervals. This will avoid maternal nutrient depletion, improve women's immediate nutritional status and will have a positive impact on pregnancy outcomes such as birth weight, maternal survival, and infant morbidity and mortality.
- Increasing maternal food intake is also important. All pregnant women need more calories to ensure the adequate weight gain needed for optimal fetal growth and favorable birth outcomes. Similarly, lactating mothers need more calories to meet the energy requirements associated with lactation. Pregnant and lactating mothers should consume the equivalent of an extra meal per day (between 500 and 700 extra kcal). Undernourished pregnant and lactating women have an even greater need for increased food intake. The beneficial effects of food supplementation on maternal nutritional status, and pregnancy and lactation outcomes will therefore be greatest when food supplementation targets undernourished women. Those aspects can be fostered through the use of supplementary feeding using food aid¹⁴ and through well-designed IEC campaigns targeting both men and women to improve intra-household distribution of resources, in favor of pregnant and lactating mothers.
- Reduce the demand for female labor during and after pregnancies. The access to labor saving devices and the promotion of intra-household division of labor are also important. Women should reduce workload during pregnancy and lactation to decrease energy expenditure and optimize energy balance. This is an area where good synergy can be generated by working across sectors. Research and extension in agriculture can strive to be women- and nutrition-friendly, for instance by developing technologies that contribute in reducing women's workload—e.g. in the area of food preparation, seed crops can be tested that are easier to mill and cook faster; or in the area of energy, technologies may be developed that reduce Fuelwood consumption –and gathering—considerably.

¹⁴ Supplementary feeding can also come from local resources. The positive deviance model, for instance (or some of its variants, such as the Hearth model), have proven very successful in sustainably increasing child and maternal food intake. Those could usefully be adapted to the reality of Madagascar.

CHAPTER 6: DISASTERS AND FOOD SECURITY IN MADAGASCAR

Madagascar regularly experiences natural calamities that seriously compromise household food security. Three main types of disasters cyclically strike the island: pest infestations (mainly locusts), cyclones (and their subsequent floods), and drought. To these, one must add cholera, which appeared in the late 1990s and was eventually contained, but is forecasted to resurface periodically in the future.¹⁵ All such disasters have the potential of affecting food security, albeit in different ways and to different extents, depending on the type of disaster and where it occurs.

Pest Infestations

Every year locusts flare up in the south of Madagascar between the Mahafaly plains and the southeastern Anosy mountains. The risk of this resulting in a full spate is intimately linked to the rainfall patterns: there has to be three continuous months of 50-150mm rainfall during the development cycle of the larvae in the gregarious zone for locusts to begin to regroup, pullulate and eventually initiate their migration to other areas. Once the invasion has started, swarms may travel to any place on the island. At that stage, locust infestation represents a threat to all Malagasy farmers. The threat is serious: the last great locust infestation lasted eighteen years, from 1939 to 1957, with a peak in 1945 that destroyed 20,000 tons of rice in the Maravoay plains of Mahajunga, one of the country's main breadbaskets. The plague was only detained by a change in pluviometric patterns. Since 1992, there has been a resurgence of the problem. In 1996 swarms of crickets invaded plantations all over the island, inflicting considerable damage to staple crops. The GoM has requested international help to combat the infestation, which was met with a sizeable influx of technical and financial resources from the international community.

The approach to this problem includes essentially early warning and prevention through spraying. Important efforts are currently in place in both respects. USAID granted US\$2.5 million in 1993 to respond to the intensifying pressure. The fund was used to support research in biological control products, to procure pesticides and to help operate aerial spraying. Promising biological control methods were developed by Montana State University, and USAID extended the funding through May 1995 under the Africa Emergency Locust and Grasshopper Assistance (AELGA) program. Other important efforts include those of the French Cooperation (CF), which provided financial and technical support since 1997 to revive the CNLA (Comite National de Lutte Antiacridienne) and to establish a new anti-locust research center, located in the gregarious zone of Betioky in the South. This effort is now seconded by a new program (PLAAG, *Projet de Lutte Antiacridienne dans l'Aire Gregarigene*) supported by the MINAGRI, the FAO, bilateral donors (France, EU and BAD) and by various other actors engaged in combatting the problem (NGOs, private sector, etc). PLAAG maintains an active early warning and prevention system in the gregarious zones of South Fianarantsoa and the west and south of Toliara. Information provided by local communities is "ground truthed" and aerial spraying is undertaken to control the excessive development of larvae where it is signaled.

This paper recommends a discreet role for the US on this issue, for two reasons. First, the origin of the problem, where most of the early warning and prevention activity is needed, is in the

¹⁵ Cholera was discussed under the Food Utilization chapter.

southern part of the country, where the US has so far been relatively little involved compared for instance to other donors such as France and the EU. Second, the efforts currently under way are well established, well organized and well funded. The US contribution should come in a supportive rather than lead role, including for instance financial and technical assistance to the institutions (CNLA and PLAAG) that coordinate efforts in this area. Continued funding for research and development of biological control methods is advisable, but should be closely coordinated with other donors.

Cyclones and Floods

Every year one or more cyclones strike Madagascar, causing varying degrees of destruction and fatality. On the average there are five cyclones each year, of which three attain speeds of 75kmh, and one attains 120kmh. Every three years, one of those reaches 225kmh. Most recently, between February 17 and April 2, 2000, Madagascar was battered by three consecutive cyclones that brought high winds and torrential rains to over one-third of the entire country (see Map). It is estimated that over 300,000 individuals were affected and in need of some type of emergency assistance.

The likelihood of cyclones is associated with global climatic events. The El Nino phenomenon, for instance, typically has the effect of sparing the island from the cyclones that develop in the southwestern Indian Ocean basin. The cyclone “season” starts December 15th, and runs through April 15th each year, coinciding roughly with the hungry season. Deforestation contributes to the impact of cyclones by removing windbreaks and by reducing water infiltration, resulting in increased risks of floods and landslides. All regions of Madagascar may suffer from cyclones, but the areas at highest risk are the eastern central, western central and southeastern portions of the highland (see map). Crops most likely to be affected by cyclones include bananas and other fruits, manioc, and cash crops such as coffee, litchies and mushrooms. Rice and maize crops are less likely to be directly affected, but floods can damage irrigation infrastructure.

The potential impacts of cyclones and floods on peoples’ food and livelihood security are severe. Cyclones destroy not only their crops but also their homes, and the local infrastructure—warehouses, markets, electrical lines—that support their productive undertakings. They can isolate regions by destroying roads and transport infrastructure—for instance, the floods and landslides that accompanied the year 2000 cyclones considerably affected the whole escarpment region between Fianarantsoa and Manakara by destroying the railroad, which is the lifeline of this cash crop producing area and where most food has to be imported.

Other possible effects relate to food utilization. Water contamination is common when floods occur. This may occur at the same time as the availability of health services and medical supplies is compromised by the destruction of roads in affected regions. The disruption of food supplies may also lead to inadequate food intake, of particular concern for the vulnerable such as children and pregnant and lactating women.

Droughts

Every four to seven years, El Nino haunts the region, leaving everyone guessing about how little rain might fall. The areas affected account for 15% of the nation’s population and 14 percent and 16 percent of rice and maize harvests respectively. The regions at greatest risk are located in the

southernmost part of the country, and in the center. One fivondronana in the north is also frequently affected (see map). Only the Toamasina province seems immune from drought.

The disruptive potential of a drought is tremendous. The two most severe droughts in recent history were in 1982/83 and in 1991/92. There was again considerable alarm in the 1999/2000 year, particularly in the South until the GoM requested food assistance from the international community to the level of 6,000 tons of food aid.

Unlike cyclones or floods—which happen very suddenly—droughts can be forecasted to some extent through early warning systems, and dealt with in a measured fashion. The GoM and its partners (e.g. the MADIO project in the Ambovombe, Toliara) have in fact made much progress in recent years in predicting food scarcity due to water stress, and in addressing the population's needs with the help of the international community.

Current Efforts in Disaster Preparedness, Mitigation and Prevention (DPMP)

The Government of Madagascar has set up a structure to respond to disasters. The CNS (Comite National de Secours) was set up to represent the government itself; and the CRIC (Cellule Restreinte d'Interventions aux Calamités), to provide coordination with donors PVOs, and the government. Also, the CNC (Comite National de Coordination), under the Ministry of Finance, is in charge of assessing damages when it happens, establishing priorities for response, planning the operation and managing the funds allocated to rehabilitation efforts.

The existence of this coordination structure is important, but its capacity for direct action is reduced and up until recently most efforts have been short-term and *post facto*; little was done in the area of prevention and preparedness.

USAID has been a significant actor in the area of DPMP. The Mission was instrumental in the creation of the CRIC, sponsored a disaster preparedness situation analysis by OFDA; provided funding to the anti-locust campaign; contributed to the rehabilitation of fields and infrastructures after the cyclones of 1994, 1997 and 2000; and has been a prime mover in the fight against cholera.

Through the years, the USG has provided substantial resources to disaster response: in response to the three cyclones of 2000, the USG provided more than \$3 million in emergency activities and food aid to cyclone victims. To rehabilitate infrastructure and help Madagascar better prepare for, mitigate, and respond to future natural disasters, USAID/Madagascar submitted, along with South Africa and Mozambique a request to USAID/Washington for supplemental funding which was met with a Supplemental Appropriation for \$25 million, of which Madagascar received \$3 million. An additional tranche of the Southern Africa Flood Supplemental funding was released in November 2000, with more than \$14 million going to Madagascar.

USG resources are also used in programs managed by ADRA, CARE and CRS to respond to disasters. The three US-funded P.L. 480 Title II programs active in the country (CARE, ADRA and CRS) do recognize the disruptive potential of disasters on food security, and all have

integrated disaster PMPP in their programs. They operate at two main levels: emergency relief, and development assistance.

In the area of development assistance, the main thrust is to build local capacities to respond to disaster with their own resources, while gradually building the communities' capabilities to prevent, mitigate or effectively respond to disaster. Programs of this type make every effort to develop infrastructures able to withstand damage (transport infrastructure, irrigation work), and to forecast not only the short term, but also the mid- to long-term consequences of disasters. CARE, for instance, is promoting disaster preparedness in many communities along the cyclone-vulnerable eastern coast of the country.

On the relief side, the Mission and its partners will continue to support efforts to better understand where the vulnerable hot spots are, and what makes them vulnerable. Improved data collection and analysis will be critical to this task, and the Mission should make representations to the FEWS team in Washington to have Madagascar included in the list of countries being closely monitored. Also, the Mission should continue its support to INSTAT in establishing field level information systems, using a system similar to MADIO's Rural Observatory Network, but in the region of USAID focus. CRS has played an important role in responding to emergencies by providing safe drinking water and oral rehydration salt packets in various areas otherwise cut out from the rest of the country because of infrastructure collapse.

Another resource available to the Mission in its effort to improve disaster PMPP is the P.L. 480 Title II program. Besides the disaster PMPP actions taken under the regular programming of the Mission's Cooperating Sponsors, the Mission can redirect up to 10% of the food aid currently in-country to emergency response.¹⁶ This enables the USAID partners to have a rapid response capacity. This device was used in the past by CRS for instance, who diverted commodities from its regular Title II program to provide immediate relief to cyclone victims. The already-existing network established and maintained by the Title II CSs also makes rapid and widespread emergency response feasible.

Finally, OFDA has been the conduit for several grants over the years (to CRS, WFP, the Church World Service, etc.) meant to either respond to crises or to improve disaster response capacity in Madagascar. OFDA also maintains strategic reserves of emergency supplies in critical regions of the world, which the USAID Mission can call upon in the eventuality of a disaster (for more details, see the Mission Disaster Relief Plan, 2001).

¹⁶ Two important caveats need to be mentioned here. First, and according to recent Guidance, the CSs will only get reimbursed by Washington for those resources if they seek the approval of the BHR/FFP office in Washington first, and before proceeding with the reprogramming. Once FFP/W clearance is obtained, the CSs can request those resources to be reimbursed as part of its next call forward. Second, the CSs often do not have 10% of commodities at hand at the time the disaster strikes. FFP/W strongly discourages CSs from building up reserves or prepositioning food. FFP/w does not, however, have a problem with the creation of a large pipeline. In order to have the maximum amount of commodities at hand during the cyclone season, for instance, the CSs may carry a larger pipeline for that period, and make fewer call forwards after.

CHAPTER 7: RESOURCES AVAILABLE FOR FOOD SECURITY INTERVENTIONS

Resources available to the USAID Mission in Antananarivo include Development Assistance funds; Child Survival and Diseases (CSD); P.L. 480 Title II commodities; and commodities provided under USDA's 416(b) section (also referred to as Commodity Credit Corporation, or CCC). In the past, USAID has used both development assistance (DA) and Title II resources to improve the nutrition and food security of four target groups, identified as the most food insecure: (1) the urban poor; (2) children under five; (3) pregnant and lactating women; and (4) populations in disaster-prone, isolated regions.

Development Assistance

Development Assistance and Child Survival and Disease funds are programmed in support of USAID Madagascar's FY 1997-2003 Country Strategic Plan. Programs are executed locally through Cooperative Agreements (CAs), usually with US-based international contractors, in close coordination with in-country USAID management. Mission programs are also supported by centrally-managed activities managed by USAID's Global and Humanitarian Response Bureaus. Title II programs are food aid programs, also granted for five year periods through the Bureau of Humanitarian Response, Food for Peace Office (BHR/FFP) and executed locally by USAID's Cooperating Sponsors.

Current Use of DA Funding in USAID/Antananarivo

Currently, the Agency's resources are managed through two Strategic Objectives (SOs), and one Special Objective (SPO) (see below).

The SPO, "Improved Environment for Private Initiative", has been instrumental in providing analysis for better decision making. DA resources were used under this SPO to undertake economic analysis of the determinants of agricultural productivity and rural household welfare, and to support policy decision-making for poverty alleviation (See list of papers produced in Annex 2).

SO2, "Smaller Healthier Families", is administratively responsible for the Title II program, which concentrates largely on the alleviation of food insecurity. The Title II program is described below in more details. Besides its T-II program, SO2 supported a broad array of activities directly related to the food utilization aspect of food security. This included support to child survival activities, the dissemination of appropriate child feeding practices, training in reproductive health, and family planning activities.

SO3, "Biologically diverse ecosystems conserved in priority conservation zones" supported research to increase rice productivity and provided support to the national University's Agriculture Department. It also supported technology development to intensify high-value crop production and processing, and to conserve soil and water.

P.L. 480, Title II Resources

P.L. 480, Title II development resources (i.e. non-emergency food aid) constitute the single largest source of USAID funding focused on food security. As a flexible resource that can be programmed in-kind or monetized, food aid is used to provide on-site feeding or take-home rations or to generate local currency for development activities. Monetization can also encourage market development by promoting private sector participation in marketing. Title II development food aid, when integrated with other USAID resources, enhances the effectiveness of agriculture/natural resource management, child survival, nutrition education, family planning and community development activities.

Agency-wide, approximately half of Title II development resources are used in Health and Nutrition and Water and Sanitation activities, which directly support proven interventions to improve child survival and nutrition, such as promotion of exclusive breastfeeding, prevention and treatment of preventable childhood diseases, including diarrhea, increased micronutrient consumption, and improvements in ante-natal care. A second priority focus for Title II development resources is Agriculture and Natural Resource Management activities. These activities work at the community level with small farmers and their families, providing technical assistance and training to promote sustainable farming practices, more productive and more diversified farming systems, and improved post-harvest management and marketing. Title II agricultural activities often include the improvement of physical resources through the construction of small-scale irrigation and drainage systems, as well as soil and water conservation infrastructure through food-for-work programs. These activities increase sustainable yields, thus contributing to improvements in the availability of and access to food by poor rural households, both now and in the future.

Title II development activities are designed to achieve sustainable impact on food insecurity. However, a natural or man-made crisis has the potential of derailing a development activity plan. In areas prone to crises, Title II implementing partners are encouraged to develop plans (e.g. Disaster Mitigation and Response components) to deal with the transitory food insecurity caused by an emergency while keeping the development activity on track. Title II resources may then be used to support these and other emergency humanitarian assistance programs, such as general relief, and other child and institutional feeding programs which do not contain a significant health component. HIV/AIDS distribution programs and disaster mitigation activities also fall into this category.

Title II development programs use food in-kind to provide on-site feeding and take home rations for nutritional recuperation and nutritional supplementation. Take-home rations are used to provide an incentive for program participation (e.g. attendance at health and nutrition education sessions). Food is used as an income transfer in safety net programs (take-home rations) or to provide food resources to institutions such as orphanages and hospices. Through food-for-work (FFW) activities, food aid mobilizes poor people's labor to create employment and income, as well as build and strengthen the health and agricultural infrastructure necessary for sustainable development.

The monetization of Title II development commodities allows Cooperating Sponsors (CSs) to generate funds to implement food security-related activities in support of direct distribution of

commodities. In addition, it permits CSs to implement activities that do not have direct distribution for food as a component, when the food security problem assessment has identified other aspects that need to be addressed to bring about long-term sustainable increases in food security. For example, food rations might be used in food-for-work activities to construct small-scale irrigation networks, while local currencies from monetization are used to support agricultural extensionists who provide training in new cropping techniques to maximize the benefit of the new irrigation system. In another activity, 100 percent of commodities might be monetized to support the establishment of village banks that increase the access of women to small loans. The flexibility that monetization affords lets the CSs design and implement activities that can more closely respond to the needs identified in the food security problem assessment.

Resource Integration

While monetization can and does play an important role in the implementation of activities that are able to address the principal determinants of food insecurity, there are two problems that have resulted from the increased proportion of Title II commodities that are being monetized. First, the amounts of commodities being monetized are starting to have Bellmon amendment implications in some countries with relatively small markets. While the Farm Bill legislation permits third-country monetization (monetizing commodities in one country and using the currencies generated to fund activities in another country in the same region), some countries and even some regions may not have the capacity to absorb greatly increased amounts of monetized commodities without possible disincentives to local production. In addition, a number of practical constraints (e.g. currency regulations) may further limit the scope for third-country monetization.

A second problem results because non value-added bulk commodities, such as soybean meal, crude degummed soy oil and wheat, are the commodities predominantly requested for monetization, the Agency has had increased difficulty in meeting the P.L. 480 legislation-mandated minimums for value-added commodities, particularly the processed and blended products. This has caused considerable concern among important domestic constituencies.

The Agency's *Food Aid and Food Security Policy Paper* emphasizes that food aid "should be integrated to a greater extent with other USAID assistance resources." Given the increasing limitations placed on monetization as a source of local currency resources, Missions with significant food aid activities need to ensure that adequate resources are made available to fund at least part of the complementary activities needed to assure maximum impact of the Title II funded activities. For example, a Mission might use bilateral Child Survival resources to fund the village health promoter and behavior change components of a community-based MCHN program, while Title II food is used to provide nutritional supplementation and an incentive for program participation.

In addition to the integration of resources within a Title II program, the integration of Title II development resources into the Missions' strategic planning process is critical. Integration is necessary to maximize the complementarity and synergy of Title II development-supported activities with other in-country development interventions, Mission objectives, and other donor strategies. Thus through the strategic integration process, a Mission may decide to focus part of

their DA resources on improving the quality and availability of services provided by government (e.g. rural health clinics) to complement Title II-funded work at the community-level to increase the demand for those services, the community-based follow-up system, and the on-going support for behavior change.

Title II Programs Currently Active in Madagascar

Currently, three Cooperating Sponsors (ADRA, CARE and CRS) receive Title II resources to develop activities, under the administrative responsibility of SO2. By congressional mandate, recipients of Title II resources must address food security issues. The programs developed by the three Cooperating Sponsors (CSs) are briefly described below.

ADRA

The Adventist Development and Relief Agency has concentrated its activity in the Moramanga region, focusing its action on improving natural resource management and increasing agricultural productivity among target populations. ADRA's strategic goal in Madagascar is to "Sustainably increase the number of households in intervention areas that have enough food to cover their needs for the whole year". The ADRA Title II program, which initiated its activities in 1998, will receive the equivalent of five million dollars in commodities over the life of the program (five years). Most of the commodities are monetized, and the proceeds are used to support program activities. Interventions areas include farmer training in rice production (using the SRI/SRA approach); income generation through agricultural diversification (manioc, sweet potatoes, vegetables); and training in natural resource management through environmental education, the promotion of technologies adapted to hillside agriculture, and reforestation. A small Family Planning program was also developed to accompany the AG/NRM activities.

In addition, ADRA has received a BHR/PVC Child Survival Grant (US\$1,366,000) to work in collaboration with the GoM in the Toamasina province, using the innovative "Child to Child" model. Finally, ADRA has been a steady supporter of the CNS/CRIC (cyclone intervention team), and played an important role in rehabilitating infrastructure in Moramanga after the Eline and Gloria cyclones of 2000. In the future ADRA expects to continue its work in agriculture, health and NRM; to increase its capacity in emergency response; and to work with the Education department in developing a curriculum that responds to the practical needs of the population.

CARE

CARE's MAHAVITA project is funded through both Title II monetization resources and TOUCH 2000, a direct child survival grant from USAID/M. The principal objective of the MAHAVITA program is to develop sustainable health and sanitation services among poor households living in urban areas. Initially designed to focus in 30 poor neighborhoods of the capital city, Antananarivo, the program was later extended to the city of Tamatave. The MAHAVITA program resulted from the fusion of two earlier urban projects, TOUCH 2000, which helped communities organize themselves in identifying their health and sanitation problems and design solutions to address those problems; and PAIQ, a program that worked on infrastructure rehabilitation in low lying neighborhoods of the city prone to inundation. In addition to those earlier activities, the current program stimulates the creation of sustainable employment around the maintenance and rehabilitation of infrastructures. The project foment

the participation of city dwellers at all the stages, from the problem analysis stage to the formulation and implementation of solution and the follow up and monitoring of activities. By the virtue of its work in urban water and sanitation, CARE was ideally positioned to respond to the cholera epidemic that afflicted the country in 1999 and 2000. In collaboration with the CDC and PSI/CMS, CARE has mobilized its network of urban community representatives to promote the use of Sur'Eau, a chlorine-based safe water kit developed to contain the spread of the epidemic.

Within its MAHAVITA program, CARE receives funding from USAID to maintain a cyclone preparedness activity (CYPREP) on the eastern coast of the island (Toamasina and Fianarantsoa provinces). CYPREP's goal is to strengthen livelihood security among communities most prone to suffer from cyclones, by helping them develop contingency plan and strengthen their capacity in responding to cyclonic events. Finally, CARE works with funding from various sources to develop the Masoala National Park, in the northeastern part of the country. The goal is to help communities manage the park and its buffer zones, by supporting the exploitation of natural resources in a sustainable way, while providing economic returns to the local population.

CRS

The CRS program is funded through both Title II monetization funds and a direct child survival (CSD funds) grant from USAID/M to CRS/M. Currently, Title II resources programmed by the Catholic Relief Services in Madagascar represents 8,992 metric tons of commodities, including 3,222 MT that are monetized to provide financial resources for program support. The remainder is used for direct distribution to beneficiaries in eight dioceses of the country. CRS's Title II program comprises four main components: a Food Assisted Child Survival program (FACS); an Agricultural and Natural Resources program (AG/NRM); an emergency preparedness, mitigation and prevention program (PMP) and a safety net/general relief (GR) program. Those programs are active in Antananarivo, Fianarantsoa, Toamasina and Mahajanga provinces. In the FACS component, community-based Growth Monitoring sessions are used to identify malnourished children, whose mothers are then provided with nutrition education and with take home rations. In addition to this FACS activity, CRS and its partners implement behavior change activities in the areas of diarrhea management, immunization and maternal health/prenatal care. The AG/NRM program aims at sustainably increase rice yields in partner areas by providing training in improved rice cultivation techniques (SRI/SRA), distributing seeds and tools, and supporting the creation of small credit and savings association. Also, training is provided to promote crop diversification, using the same model as with the rice component. The PMP program includes vulnerability assessment mapping (VAM) in disaster prone areas, and the participatory development of disaster contingency plans. CRS also provides response to natural disasters when they occur, using Food For Work to rehabilitate shelters, restore agricultural plots, rebuild schools and infrastructures, etc. This component also includes response mechanisms for cholera prevention and food assistance to drought-stricken areas in the South. The GR component, finally, provides wet rations to institutionalized vulnerable groups such as orphans, the handicapped, elderly and chronically ill persons.

CHAPTER 8: OTHER DEVELOPMENT INTERVENTIONS

This section examines the geographic and sectoral focus of interventions that affect food security conditions in Madagascar. The situation in this respect is fluid and constantly evolving, hence no specific recommendations are made as to where exactly should the Mission invest its resources. The previous Chapters examined what should be done. Future decisions in this regard will also need to specify where to do it, and this requires taking into account who else does what and where. This Chapter provides a first exploration of this issue, beginning with a review of foreign assistance in the country by sector and geographic focus.

Overview of Foreign Assistance in Madagascar

The most recent analysis of foreign assistance to Madagascar covers the year 1999. In 1999 Madagascar received the equivalent of 373.9 million U.S. dollars in foreign assistance.¹⁷ The major donors in 1998-1999 as listed in Table 17 were the World Bank, followed by the EU, France and the USG. Assistance in the form of donations formed 67% of the total while loans constituted 33%.

Table 17: Total Contribution to Madagascar by Major Donors, 1998-1999 (US\$000)

Donor	1998	1999	Cumulative, 1998-1999	
			Amount	Proportion
World Bank	77,049	81,890	158,939	23.8
European Union	81,689	54,971	136,660	20.5
France	36,369	96,465	132,834	19.9
United States	21,441	26,567	48,008	7.2
Japan	15,026	19,338	34,363	5.2
Germany	15,211	16,245	31,456	4.8
IMF	0	18,594	18,594	2.8
UNICEF	5,697	7,382	13,079	2.0
Switzerland	3,450	6,948	10,397	1.6
UNDP	3,650	6,528	10,178	1.5

Foreign assistance resources were invested in almost every aspect of the economy, from macro-economic structural adjustment to drug and crime prevention. Table 18 lists the main targets of foreign assistance and the proportion going to each. Substantial variability appears to exist in some sectors—economic management and agriculture, in particular, bounce erratically between years. Part of this is conjectural: France's debt forgiveness for instance, which was interpreted as a development aid, explains the large jump in the proportion going to economic management in 1997. Other than that, and considering the end points of the time period, one notes that funding has increased in the areas of economic and social development, transportation, development

¹⁷ Not including disaster assistance, on which there are no final figures

management, and energy; whereas funding has *decreased* in agriculture, health, NRM, industry, humanitarian aid, domestic trade, communications, and disaster response and prevention.

Table 18: Foreign Aid to Madagascar by Sector by Year, 1996-1999 (% of total)

Sector	1996	1997	1998	1999
Economic management ¹⁸	10	41	7	19
Agriculture, forestry and fisheries	16	11	23	13
Education and training	14	9	12	12
Social development ¹⁹	5	5	8	10
Transport ²⁰	8	9	12	10
Health	12	6	9	9
Natural Resources Management	11	4	7	8
Regional development ²¹	4	7	10	7
Development management	1	1	3	3
Energy	1	1	2	3
Industry	4	2	3	2
Humanitarian aid	5	1	1	2
Communications	3	2	0	1
Domestic trade	4	1	1	1
Disaster PMP	3	1	1	1
International trade	0	0	0	0

Sectoral Allocations of Donor Assistance²²

Agriculture and Natural Resources Management

Agriculture is the second most important sector for donor support, after economic management, receiving 13% of all resources channeled in the country in 1999. The main donors in agriculture are the World Bank, the French Cooperation (CF), the European Union and the FAO. All major funding agencies dedicate some of their resources to national level budgetary support, policy formulation, training, and the like. Donors also provide geographically focused technical cooperation support. Donors have channeled considerable resources to the drought-prone Southern region (Toliara), perceived by many to be the most food insecure region. Key support to Toliara's agricultural sector come from the Cooperation Francaise, the EU and the GTZ. Areas

¹⁸ Includes structural adjustment assistance, development of macro-economic and financial policies, and planning

¹⁹ Includes urban development, drinking water and hygiene, judicial policies, and drug and crime prevention

²⁰ Includes roads, maritime and river transport and air transport

²¹ Include rural development, planning and development of river basins

²² A set of Tables is presented in Annex that further breaks down the information by sectoral areas. The Tables in Annex, as the discussion in this Section, concentrate on agriculture, NRM, health and nutrition, education, and infrastructure.

that receive the least support are Antsiranana in the North and Toamasina²³ and Fianarantsoa in the Eastern and Central regions. Regions that benefit moderately from international support in agriculture are Mahajanga and Antananarivo.

Natural resources management, as a standalone sector, received comparatively little (8%) of all donor resources in 1999. The level of funding going to this sector has gone down since 1996, when it received 11% of all resources. Current main donors in this area are, at the national level, the World Bank, UNDP and France, who contribute important resources in forest and soil conservation, park and reserve management and development of the eco-tourism industry. Much of those resources are made available through the National Environment Office (ONE). Actors that promote punctual interventions include the GTZ, which supports environmental education, forest, water and soil conservation in various localities of Antananarivo, Toliara, Antsiranana and Toamasina. and Holand, which supports CARE's work in the Masoala biological reserve in Antsiranana.

Sectorally, USAID/M and its partners have a strong comparative advantage in agricultural development and natural resources management: the LDI project is clearly a front runner in the Fianarantsoa/Moramanga bio-diversity corridor, covering both natural resources conservation and agricultural intensification. Likewise, ADRA and CRS have well established programs in critical areas of the country fostering agricultural diversification and intensification, coupled with improved natural resource management. The ECHO project complements the LDI and Title II projects by linking environment, population and health issues in their areas of operation. PACT is another important player in the environmental area, being the prime recipient of USAID's environmental program (with its subgrantee partners the World Wildlife Fund, or WWF, and Conservation International, or CI). The work of PACT and its partners focuses on building capacity at the National Environment Office (Office National de l'Environnement or ONE) and local organizations, whereas WWF and CI focus on improving Protected Area management and improving the forest resource management capacities of the Ministry of Water and Forests. PACT also works closely with LDI on institution building of local community groups in places where LDI is located. Thematically, the AG/NRM model as pursued by USAID and its partners is well rounded and should be pursued.

Geographically, USAID's areas of greatest investment have been the Fianarantsoa and Toamasina provinces in the bio-diversity corridor along the Tanala escarpment, from Befotoka to Moramanga. The work of LDI, ECHO and ADRA particularly stands out in this region. LDI is also involved in Mahajanga, fostering a reduction of slash and burn through agricultural diversification and intensification. Other areas that have been targeted by USAID and its partners, but to a lesser extent, include Toliara (Tolagnaro/ Ford Dauphin area); and Antsiranana (around Montagne d'Ambre).

Health Sector

Foreign aid to the Health Sector in 1998²⁴ amounted to \$29.2 million. This represented 25.2% of all health related expenses (private and public) and 47.7% of public sector expenses. The State

²³ It should further be noted that the support provided in Toamasina tends to be highly targeted, focusing either on the agro-export producing zone along the coast, or in the rice producing region of Lake Alaotra.

provided 47.6% of the total and household contributions represented the remainder, i.e. 4.7%, obtained through cost recovery schemes.

The health sector is characterized by large programs with national amplitude—the World Bank’s CRESAN-II and SEECALINE projects, the WHO/MoH partnership are good examples of this. Besides covering wide geographical areas, those projects support a large gamut of issues, from vaccination to BCC, malaria, health staff training, provision of medicines and supplies, maternal care and HIV/AIDS. The Institut Louis Pasteur, supported by France, provides research facilities on various health topics and disease diagnosis, testing and treatment; and institutes such as the Association Francaise Raoul Folereau provide specialized expertise in particular areas such as leprosy, pest and TB.

The province that most benefit from foreign assistance to the health sector is Mahajanga (US\$1.79 per person). The province that benefits the least is Fianarantsoa (US\$1.08 per person). The sub-sector most favored by donors for investment is nutrition (14.9% of all aid resources). Immunization comes as a distant second with 6% (see Table 19). Most of those attributions have remained stable over time, except for family planning, which has seen a steep decline from 16.1% of the total in 1997, to 3.0% in 1998, with some of the FP funding being reallocated to maternal health.

Table 19: Destination of Foreign Aid to Health in Madagascar by Sub-sector

Program	Amount (US\$ 1000)	Proportion of total amount (%)
Nutrition	4,344	14.9
EPI	1,760	6.0
Polio eradication	1,256	4.3
Maternal health	1,207	4.1
Leprosy	976	3.3
Family planning	883	3.0
HIV/AIDS/STDs	678	2.3
TB	646	2.2
PCIME	427	1.5
Malagia	43	1.4
Pest	269	0.9
TDCI	170	0.6
Bilharzia	2	0

²⁴ The most comprehensive analysis of the foreign aid in the health sector is provided by the Ministry of Health document titled “Aide Exterieur a la Sante” (1999). Additional information is available, but not as finely analyzed. In any case, since it appears that little has changed in 1999 and 2000 in the attribution between donors, sectors and geographical zones, we use the 1999 document as our main source.

USAID/M's greatest comparative advantages in the health sector, particularly through the work of the JSI and Linkages projects, are in the areas of reproductive health (family planning, STDs and safe motherhood); 2) STD/HIV prevention programs through CMS/PSI social marketing of condoms and medical education; 3) child survival (IMCI, EPI and nutrition); and 4) community empowerment (skills training, IEC/BCC). Geographically focused in twenty districts of Fianarantsoa and Antananarivo, the work of JSI and LINKAGES currently provides coverage for approximately a third of the country's population.

Infrastructure

The GoM documentation on development assistance regroups water/sanitation and urban development together with the judiciary and drug enforcement under the "Social Development" heading. For the purpose of our analysis, and since water and sanitation and urban development—particularly of the kind that is undertaken in Madagascar—are essentially infrastructure initiatives, we consider the Social Development rubric along with infrastructure.²⁵

The largest players in this area are the World Bank, the European Union, France and the GTZ. Total allocations to both Social Development and to Transport have both increased steadily over the last few years, absorbing together 20% of total resources in 1999 as compared to 13% in 1996. Combining the two makes investment in infrastructural equipment the single most important sector of development in the country today—good news indeed, given what was said in this document with respect to the dismal conditions of infrastructure in the country, and the constraints this situation imposes on economic and social development. Yet the size of the problem, particularly in remote areas, dwarfs those efforts.

With respect to transportation, the geographical focus of efforts is difficult to pinpoint. Some donors—such as the Arab Development Bank, which finances bridges; AFB, which finances secondary airports; or GTZ, which finances ports—target important resources on a specific aspect of the infrastructure all over the country. Others provide assistance on a demand basis—WFP, for instance emphasizes (understandably, given their mandate) disaster response over a structured national master plan in allocating its Food for Work resources to support road repair and maintenance.

Given the magnitude of the task, and the relatively limited experience of USAID/M in this area, it seems prudent for the Agency and its partners to approach the transportation issue as an ancillary rather than central component its local development efforts. This is not to say it should be avoided but care must be taken so the high costs of transport infrastructure do not end up displacing the critical resources going to other sectors of intervention. As mentioned in some of the studies quoted earlier in this document, roads—although essential—show the lowest internal rate of return of all investments. A creative use of USG resources, judiciously targeted during the lean season, could help overcome those constraints where USAID and its partners are developing agricultural development projects. This would support agricultural growth by linking the communities being served with markets and services. The use of Food for Work scheme could be

²⁵The inclusion of drug enforcement and the judiciary in Social Development does not affect this much, as these represent a negligible portion of the investment under this heading.

contemplated in this respect,²⁶ as it may provide a safety net mechanism for food insecure populations during the most difficult periods of the year, while constructing essential infrastructure.²⁷

²⁶ However, see the caveats mentioned in Chapter 2 about possible disincentive effects on production

²⁷ ADRA for instance, working in collaboration with UNDP, used Food for Work in its Moramanga focus area to repair the road after the 2000 cyclone.

CHAPTER 9: SUMMARY AND CONCLUSIONS

We initiated our analysis by pointing at the similarities and differences between programs that aim at reducing poverty and improving food security on the one hand, and programs that aim at fostering economic growth on the other hand. We concluded that the latter (economic growth) is necessary but not sufficient for the former to happen. Although no one argues that economic growth is inherently bad for the poor and the food insecure—recession is never good for anyone—growth alone will not answer the needs of the poor unless the programs are meant to do so.

The logical next step was to define who those groups were, in order to better circumscribe their needs, and better design the interventions. It was pointed out that, whereas all the poor may benefit from food security programming, there are particular subsets within the poor that are more vulnerable to food deprivation than others. The groups most vulnerable to food insecurity were defined as children under the age of two, women and, at a more aggregate level, communities susceptible to disasters—particularly communities found in areas of cyclonic activity, which are particularly vulnerable to sudden, external shocks that may compromise their food security for generations to come.. Finally communities located in fragile eco-systems should also be targeted, as the management of resources in such areas have effects well beyond community boundaries, potentially affecting the food security of entire eco-regions. The groups thus identified were then defined as the primary targets for food security interventions.

Having identified our priority target groups, we then turned to an examination of the type of interventions that would offer the greatest food security benefits to those groups. It was observed that past redistributive schemes such as economic centralization and land reforms had failed to achieve sustainable results in reducing poverty. Another avenue consists in reducing the bottlenecks associated with individual human development—diseases, illiteracy and vulnerability to economic risk. Overcoming durably poverty and food insecurity, we argued, requires that the poor and food insecure be empowered with better health, nutrition, education and with risk-reducing options so they can surmount those conditions that keep them into poverty. Enabling thus the food insecure will make them better able to take advantage of the opportunities that come their way, so they can truly benefit from the process of economic development while society in turn gains the benefit of their participation. This approach thus effectively places education and skills acquisition, health, and safety nets/risk management at the center, or as cross-cutting themes, of all the interventions to be developed by USAID/Madagascar and its partners.

Before we turn to the content of the programs themselves, one more overarching consideration is in order, i.e.: who bears the responsibility for supporting such programs? Traditionally, the development of human capacity was perceived as a “public good”. Following the economic crises that affected developing economies in the last two decades, however, and the structural adjustment measures that reduced capacity of the State to provide for public goods, the interest for alternative sources of support has grown. Concurrently, the inherent thrust of structural reforms to liberalize and privatize the public sector raised the profile of the private sector in this respect—sometimes to the point of viewing the private sector as the sole option to face the

contraction of the public sphere (see for instance the World Bank's 1990 World Development Report). Although it is certain that much untapped potential exists in the private sector to provide for goods and services previously defined as public, it is now being recognized that the instruments needed to hand over the provision of such goods and services to the private sector are not always well understood and will need much further refinement before they can fulfill these functions sustainably; or else that some of these goods and services will always transcend the capacity of the private sector (see the World Bank's 2000 World Development Report). Eventually, the resources to pursue developmental actions should creatively draw from all sectors of society, combining the creative potential of the private sector, the State, and civil society. As this transition occurs, the international donor community is left with two crucial roles to play: 1) facilitate the process of discovering such new modes of interventions; and 2) protect the vulnerable as those approaches get developed. Those considerations are present as we elaborate on the situation in Madagascar, and on the possible options to address current problems.

The document then turns to the content of food security programs themselves. The food security of a population is determined at three distinct levels: aggregate availability of food; access of households and domestic units to food; and capacity of individuals to utilize the food they get. In terms of food availability, the Mission should pursue a three-pronged strategy. (i) Food availability should be pursued at the national level by supporting food policy analysis, particularly in the areas of domestic food production, food imports and national food balance sheet. This will be especially important, given the predicted growth in the national food gap over the coming decade. (ii) In regions where food markets can be supplied on a year-round basis, food availability should be pursued by supporting an agricultural diversification strategy that a) stimulates regional market exchanges and agro-export production; and b) supports personal and aggregate income growth through a division of labor based on regional comparative advantages. (iii) In remote areas the availability of food will be fostered by promoting local self provisioning strategies, while the infrastructure necessary to establish market linkages is being established. In those remote regions, the opening of trade links, market structures and storage facilities should accompany efforts at intensifying staple crop production, and a progressive shift towards more diverse cropping patterns should be envisioned as market alternatives become available, as in option (ii). In all regions, finally, disaster management plans should be devised to address contingencies and facilitate rapid response, while family planning activities will be conducted to contain the demand for food at the aggregate level. The means to pursue those objectives are also multi-varied and should work in combination. They include advocacy by the Mission at the highest governmental level, using the platform afforded by USAID's position as donor, to foster a conducive environment for pro-poor growth; and the technical, in kind and financial resources available to the Mission, to reduce the isolation of remote communities while strengthening civil society and supporting the development of markets and private enterprises.

Recommendations to increase food access dovetail with those meant to improve food availability. In rural regions with good market access, crop diversification and agricultural intensification will be pursued in order to increase both food crop production and the incomes generated through market sales. The particular situation of small farms with limited access to prime crop land must be considered, as these shelter a large proportion of the rural poor. Improved technologies and better extension programs are needed for food crops such as upland

rice, maize and manioc, which are more important to the rural poor than irrigated rice. For cash crops, such as vegetable and tree crops, market information systems will be required, as well as adaptive research and extension. For all crops the availability of inputs must be addressed, while the provision of credit and risk insurance should be considered as priorities. It is expected that increased demand for seeds, fertilizers and other inputs will stimulate the emerging input market, and allow to reduce direct and transaction costs. In urban areas food access is primarily dependent upon household income and food prices. Two main areas of interventions should help urban food access: 1) reduce and stabilize food prices—which will be best done by supporting rural production and food markets; and 2) improve employment prospects for the poor, and this will be best achieved by raising education levels and providing people with life skills. Other measures may include direct employment creation, for instance in areas where public needs are permanent and large, such as water and sanitation infrastructure.

To achieve a better utilization of food, the Mission and its partners must maintain their focus on the most vulnerable groups—women and children under two years of age—while continuing to promote the set of core, high impact interventions already in place. Evidence from recent surveys (DHS, EPM) point to areas where most progress remains to be done. With respect to maternal health, areas in critical need of action include maternal nutrition (increase protein/energy and micro-nutrient—particularly vitamin A and iron—intake), neonatal health services (particularly delivery assistance), and women’s knowledge and practices in the areas of family planning (particularly birth spacing, reduce the age of first pregnancy, and STD/HIV/AIDS prevention). With respect to children under two years of age, actions should most urgently focus on increasing exclusive breastfeeding rates for infants less than 6 months of age, and mothers need to upgrade their complementary feeding practices after six months of age. Improving immunization coverage will also be key as current rates are very low. In urban areas, the same objectives prevail, but the context is different. Because urban women tend to work more outside the home, they are more exposed to the tradeoffs between their wage earning and care-giving roles. Support to care-giving should be introduced as part of urban programs. Also specific education messages to improve maternal feeding practices should be developed for women in urban areas. Complementary to all those initiatives, efforts must be upgraded to improve the availability of potable water and sanitation infrastructure in all areas.

ANNEX 1: TABLES

Breakdown of Development Assistance by Sector, Geographic Focus and Donor²⁸

Table A.1:

Areas of Intervention for Development Assistance by Donor and Geographical Area:
Agriculture, Livestock and Fisheries

Sector	Sectoral Focus	Donor	Geographical focus
Agricultural research	Rice	FAO	National
		CF/CIRAD	Antananarivo (Antsirabe)
	Manioc	NORAD/CARE	Toliara
		PAPAT	Toliara
	Maize	EU	Antananarivo, Mahajanga
		EIB	Antananarivo, Mahajanga
Agricultural extension	Training of GoM staff	CF	Antsiranana, Toamasina
	Training of agricultural institutions	WB (ended 2000)	National
		UNDP	Toliara, Fianarantsoa
	Training of farmers/ Local capacity building/ Creation of local producer associations	CF/CIRAD	Toliara
		GTZ	Toliara, Mahajanga
		Japan	Antananarivo (Antsirabe)
		FAO	Toamasina, Fianarantsoa (coast)
		EU	Antsiranana, Toamasina
		AFD	Toamasina (Lake Alaotra)
		Switzerland	Antananarivo, Mahajanga
		Holland/CARE	Antsiranana (Masoala)
		WB	National
Production	Micro credit	WB	National
		AFD	Toliara
	Seeds	FAO	Disaster-stricken areas
Rural Infrastructure	Agricultural markets, roads, storage facilities	WFP	National
		Japan	Toamasina (Lake Alaotra)
		GTZ	Mahajanga
	Irrigation	WB	National
		CF	National
		FAO/MINAG	National
		WFP	National
		AFD	Faranfangana
		UNDP	Toliara, Fianarantsoa
Livestock	Breeding	EU	Toliara
		NORAD	National

²⁸ The Tables list most important donors for each of those sectors, along with their geographic zone of concentration. Note that these Tables do not pretend to be complete. New projects and programs emerge regularly, and to provide an exact, updated picture of the institutional landscape is almost impossible. The aim is rather to provide a *general overview* of the thematic and geographic areas currently targeted by each donor, in order to identify potential gaps. Note also that the Tables exclude USAID-funded projects, already described in the text.

Sector	Sectoral Focus	Donor	Geographical focus
	Institutional capacity	CF/MPE	National
	Dairy	AFD	National
		FAO	National
	Animal health	FAO/CIRAD	National
		AFD	National
	Food safety	WB	National
		WHO	National
		AFD	National
Fisheries	Sector development	EU	National
		CF, FAO, Japan	National
		AFD	National (shrimp industry)
		GTZ	Mahajanga, Antsiranana
		UNDP	Toliara, Fianarantsoa
		Holland/CARE	Antsiranana (Masoala)

Table A.2:

Areas of Intervention for Development Assistance by Donor and Geographical Area: Health

Sector	Sectoral Focus	Donor	Geographical focus
Health	Behavior change communication	WB/CRESAN II	National
	Improved access to health care services	WB/CRESAN II	National
		Unicef	National
		MSF	Antananarivo (Tana, Antsirabe)
	Health staff training	WB/CRESAN II	National
		WB/SEECALINE	National
		Unicef	National
		UNDP	Toliara, Fianarantsoa
		GTZ	Mahajanga
	Improved access to equipment, drugs and supplies	EU	National
		WB/CRESAN II	National
	Vaccination	WHO/MoH	National
		EU	National
		Unicef	National
	Improved policy environment	WB/CRESAN II	National
		WHO/MoH	National
		EU/MoH	National
		UNFPA	National
	Data for decision making	WB/CRESAN II	National
		WHO/MoH	National
		Institut Pasteur	National
		CF/ORSTOM	National
	HIV/AIDS, STDs	WHO/MoH	National
		UNAIDS, UNFPA	National
		EU	National
		UNICEF	National
	Cholera	WHO/MoH	National
		UNICEF	National
		CF	National
	Malaria	WHO/MoH	National
		UNICEF	National
		CF	National
		Italy	National
	Others (TB, plague, leprosy)	WHO/MoH	National
		CF	National
		AFRF	National
	Maternal care, reproductive health and adolescent health	WHO/MoH	National
		UNICEF	National
		CF	National
		UNFPA	National

Table A.3:

Areas of Intervention for Development Assistance by Donor and Geographical Area: Nutrition

Sector	Sectoral Focus	Donor	Geographical focus
Growth Monitoring with nutrition counseling and IEC	Community- and Center-based with food ration distribution	WB/SEECALINE	National
		UNICEF/NAC	National
		GTZ	Toliara
		GRET	Antananarivo Toamasina
Micro-nutrients	Vitamin A, Iron Folate and Anti-Helminth distribution	WB/SEECALINE	National
		UNICEF/MoH	National
	Iodine	UNICEF/MoH	National

Table A.4:

Areas of Intervention for Development Assistance by Donor and Geographical Area: Natural Resources Management

Sector	Sectoral Focus	Donor	Geographical focus
Conservation	Policy support	WB/ONE	National, Antananarivo, Fianar
		CF	National
		UNDP/ONE	National
		GTZ	Antsiranana, Toamasina, Mahajan
	Environmental education	GTZ	Antananarivo (Vakinankaratra)
		Holland/CARE	Antsiranana (Masoala)
	Water conservation	GTZ	Toliara (Bekily), Antananarivo
	Soil conservation	WB/ONE	National
		GTZ	Mahajanga (Betsiboka)
	Forest conservation	WB/ONE	National
		AFD	National
		CIRAD/FOFIFA	National (FOFIFA stations)
		Holland/CARE	Antsiranana (Masoala)
		WFP	National (reforestation)
		GTZ	Antananarivo (Vakinankaratra)
Sector development	Eco-tourism	WB/ONE	National
	Park and reserves management	WB/ONE	National
		Holland/CARE	Antsiranana (Masoala)
		GTZ/KFW	Ankaranfantsika

Table A.5:

Areas of Intervention for Development Assistance by Donor and Geographical Area:
Disaster Preparedness, Mitigation and Prevention

Sector	Sectoral Focus	Donor	Geographical focus
Cyclones	Infrastructure repair	WB/FID-III	National
		WFP	National
	Emergency management	CF	National (Food Aid)
		EU	National
		WFP	National (Food Aid)
		FAO	National (seeds, tools)
		BAD	National
		UK, GTZ, Italy	National
		Japan	National (Food Aid)
Locust control	Research	CF	Toliara
		FAO	National
	Operations	CF	Toliara
		GTZ	Toliara
Early warning	Early warning	WB	National
		WFP/CNS	National
		CF	National (MADIO/ROR)
	Vulnerability analysis (VAM)	NORAD/CARE	National
		CF	National (MADIO/ROR)

Table A.6:

Areas of Intervention for Development Assistance by Donor and Geographical Area:
Infrastructure

Sector	Sectoral Focus	Donor	Geographical focus
Transport Infrastructure	Road construction/ maintenance (including bridges, ports, railroads)	EU	National (roads, airports)
		CF	National (road maintenance)
		KFW (Germany)	National (ports)
		NORAD/ILO	Toliara
		AFD	Antananarivo, Toliara
		Arab Development Bank	National (bridge rehabilitation)
Public facilities	Schools	NORAD/ILO	Toliara
		JICA	Mahajanga
	Hospitals, clinics	GTZ	Mahajanga
		UNDP	Fianarantsoa, Toliara
Utilities	Telecom	EU	National (secondary cities)
		CF	National
		AFD	National
	Energy	WB	National
		WB	National

Water and sanitation	Potable water	GTZ	Mahajanga, Toliara
		AFD	Antananarivo
		UNICEF	National
		WB	National
	Sanitation	GTZ	Mahajanga
		UNDP	Toliara, Fianarantsoa

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